The Builder.

SATURDAY, JANUARY 28, 1854.

AT a meeting of her Majesty's justices for Middlesex, last week, Mr. Armstrong called attention to a return relative to the district surveyors of the county, laid before the Court on a previous day. The hon. magistrate, as we are informed, charged the surveyors with neglect of duty in not sending to the Clerk of the Peace returns required under the standing orders of the court, and said that those gentlemen who canvassed for their situations with such avidity, ought to be compelled to do their duty properly. He had a return of nine cases of serious accidents, seven of which were in Middlesex, and these would have been avoided had the surveyors done their duty. As to the returns, some were imperfect, but in seven instances no return at all had been made; and as the surveyors held their situations only during the pleasure of the Court, the Court was bound to exercise its control over them.

In the course of the discussion which followed, it was truly stated that in the complicated provisions of the Buildings Acts, the surveyors had not the power of doing that for which really the public thought they were appointed. Nevertheless it was ordered that a copy of the standing order, stating that they held office "during the pleasure of the Court," should be sent to each of them, with an intimation that the Court must compel their compliance with the regulation laid down as to the returns.

Ultimately, Mr. Burslem gave notice that he would at the next Court move for the appointment of a committee to take the subject into consideration.

The district surveyors are placed in a very awkward and embarrassing position: their powers on some points being misunderstood by the public, more is expected of them than they have the means of effecting. The Act is full of weaknesses, and the Metropolitan Buildings Office uncertain; while the builders in too many cases are with difficulty led to comply strictly with the requirements of the Act, their immediate interest being opposed to it. Moreover, if we may venture to say so without offence, some of the sitting magistrates themselves have not always given the district surveyors that support in their endeavours to carry out the awards of the referees, which was to be desired.

As to the non-fulfilment of the by-law, ordering the surveyors to forward to the Clerk of the Peace copies of the returns made to the Registrar of Metropolitan Buildings, this has proceeded in one or more cases, as we happen to know, simply from the fact that the requirement had not before been brought under the attention of the surveyor. It does not appear in the Act of Parliament.

Some of the surveyors more immediately connected in their districts, held a meeting a few days ago, with the view of obtaining a greater uniformity of practice than exists on some few points. We would urge builders to remember that the district surveyors have a duty which they have *sworn* to perform, and that they are amenable for any dereliction of it. In cases where district surveyors have sought to strain their powers, we have never shrunk from saying so, and from defending strenuously what we believed to be right. *Nor will we now: of that the London builders may rest assured;* but in the proper discharge of their onerous and most unthankful duties, the surveyors are entitled to the support of all, and will, we have no doubt, have it.

NOTES ON THE HISTORY AND CONDITION OF THE BUILDING TRADES.

PLUMBERS.*

THE important relations this trade bears to the progress of sanitary economy, will lead us to treat at some length of its history and purpose.

The word *plumber*, it may be worth while to observe, is derived from the French noun, *plombier*, which again is based on the Latin substantive *plumbum*, lead. Both words signify an artificer or worker in that metal; but it will be seen in course of our remarks, how widely it has changed from its original signification, and how the modern artizan, who calls himself *plumber*, is about as much entitled to the name as the barber is to that of chirurgeon. We will speak first of the useful metal from which this trade derives its position. Lead is one of the most widely diffused, and one of the most important metals we possess; and it was probably worked before any of the nobler metals were discovered. It is mentioned as common in the time of the Exodus; for Moses in his song of triumph at the destruction of Pharaoh's chariots and host, in the Red Sea, uses the time-honoured metaphor familiar to all the ancient poets,—"They sank as lead in the mighty waters." We have other proofs of its common application among the Hebrews. It was among the spoils taken from the Midianites, and the articles made from it were ordered to be melted up. But one of its most singular applications was that alluded to by Job:—"Oh, that my words were now written! Oh, that they were printed in a book! That they were graven with an iron pen and lead in the rock for ever!" This passage has excited considerable discussion among commentators. It is commonly supposed to refer to engraving on a leaden tablet, which we know from Pasaninus and Pliny was a common practice among the ancient Greeks and Romans. Again, it has been held that the passage refers to a practice of cutting indented letters in the solid rock, and of filling the indentations with lead, a practice which was likewise common in several early nations. Rosenmüller, however, thinks the expression more poetical, that it is to be regarded in the same light as the metaphor used by Moses, and that it was simply intended to give a proper idea of the enduring character of his language. It is not probable, therefore, that the high art of inlaying metals was known at this early period; although there can be no doubt the metal was well known. No trace of ancient lead mines has been found within the boundaries of Palestine; and hence it is probable the Israelites obtained their supply through the Phœnicians. The Phœnicians we know imported tin and lead from Britain, and both are enumerated in the graphic account of the commerce of Tyre in the 27th chapter of Ezekiel. Ores of lead, we may mention, however, are very widely distributed over the surface of the globe. They are met with chiefly in veins, sometimes in siliceous rocks of the primary formation, and sometimes among the limestone strata of mountainous districts.

It is a very curious question whether the plumber, properly so called, was first acquainted with his business as regards covering roofs with sheets of lead, or as regards the conveyance of water through lead pipes. We are inclined to take the view that it was on roof-work the trade took its origin; for the art of casting lead into sheets is of immense antiquity. The terraces of Nebuchadnezzar's hanging gardens were covered with sheets of lead, soldered together to retain the moisture in the soil. The employment of sheet-lead as a covering for roofs seems to have also originated in the East. It is still extensively used there for this purpose. Tavernier, in speaking of the mosques at Aleppo, says their domes were covered with lead, and so was the roof of the great hall of the Divan at Constantinople. It is uncertain whether the ancients were acquainted with the art of rolling lead into sheets. The specimens we have referred to obviously consisted of sheets cast on beds of sand, after the manner which was common in this country up to a recent period. The Chinese method of manufacturing sheet-lead is probably the oldest process connected with the metallurgy of this metal; but such sheets could never be properly applied to the purposes of exterior coverings or of water supply. In the splendid temples of Greece and Rome there was, from their character and construction, no use for leaden roofs; but, as we shall presently see, this form of roof constituted an important architectural feature in the churches and castles of the Middle Ages.

Leaden pipes, we believe, are as old as the dawn of history. Archimedes used pipes of lead to distribute water by engines in the large ship built for Hiero; and the same kind were doubtless common among the Babylonians, the Persians, and the Egyptians, whose hydraulic machines were complete in their construction before the civilization of Greece and Rome. In the terraces we have mentioned in Babylon, it is plain that lead pipes must have been employed, since the great height to which the flood was raised would render earthenware or wooden pipes inapplicable. We have no information concerning the mode of making lead pipes previous to the Roman era; but as the Romans borrowed their arts chiefly from the Greeks, and through them from the earlier nations, we may feel assured that the method practised by the Romans is entitled to a still higher antiquity. Respecting the Roman pipes (*fistula*) Vitruvius distinguishes three modes of conveying water by such means: first, by channels of masonry; second, by leaden pipes; and, third, by earthenware pipes; and of these two latter the lead was most commonly employed. Roman plumbers, we learn from the same authority, generally formed their pipes by bending up plates of cast lead into a form not perfectly cylindrical, but having a sort of ridge along the whole length of the pipe formed by the junction, whether that was effected by solder or by the process called *burning*. The plates were cast of a length not exceeding 10 feet, the thickness of the metal being proportioned to the bore, according to a rule (Vitruvius, book viii. cap. 7) which, to a modern hydraulic engineer, seems unscientific, since it takes no account of the well-known hydrostatic law which teaches us that the pressure of fluids in pipes increases in a ratio with the squares of their diameters. In plainer terms, the Romans made a large pipe and a small pipe of equal thickness in the sides. We know very little of the earthenware pipes: they must have been, from Pliny's account, precisely analogous to the faucet tile drains of our day. They were considered best when they were made 1¼ inch thick in the sides. They were joined together by inserting the end of the one in the faucet of the next, and by filling the interspace with cement, which would stand the action of water. They were usually applied to the purpose of horizontal pipes, and were not used where water rose in a vertical position. It is particularly worthy of notice, that the Romans considered water-pipes of earthenware much more wholesome than those of lead.

We cannot pass without notice the system of plumbers' work in its connection with the different methods of water supply at that period. We will take for our examples the fountains and aqueducts. The word "fountain" (*fons*) signifies originally a natural spring of water; but both the Greeks and Romans had artificial fountains. These were made either by covering and decorating a spring with buildings and sculpture, or by making a jet or stream of water, supplied from an elevation, play into an artificial basin. Among the Greeks these formed the only public source of supply excepting the rain water, which was collected in cisterns. And at Rome, when the poor people could not afford to pay for a private supply, they, no doubt, were indebted to the public fountains. The decorations of these fountains, we may mention, were sometimes splendid. The Corinthian fountains especially were noted for their grandeur. One was adorned with covered cisterns of white marble like grottoes, out of which the water flowed into the open air, and was decorated by paintings. Others were adorned with bronze statues, with figures of dolphins, out of which the stream poured into the basin. And the celebrated fountain at Lerna was surrounded by a colonnade with seats for those who desired a cool retreat in summer. Vitruvius mentions the celebrated fountain at Salmacis, which rendered

* See Vol. XI. pp. 769, 753, 777.

effeminate all who drank of its waters, as among the most admirable works in Halicarnassus. The Romans likewise erected splendid structures over natural springs. The well-known grotto of Egeria (who, according to the ancient mythology, melted into tears, and was changed by Diana into a fountain), near Rome, consisted at first of a natural cave, but was converted by the architect into a miniature temple. The forms given to the Roman fountains themselves were numerous. Large flat vases were commonly fabricated from hard stone such as granite, breccias, and marbles, and an ingenious contrivance is still shown on an existing specimen constructed in the form of a tripod, up the centre of which passes the jet, and down the legs of which the stream overflows. More frequently, however, the water was made to flow out of the mouths and eyes of Tritons, Nereids, Satyrs, and such like mystical beings—a practice which is still pursued by the architects of fountains in our own day.

The next gigantic step in water supply was the introduction of aqueducts. Although it is out of our province to enter on the abstract subject of the Roman aqueducts, we cannot help adverting to the conflicting opinions held with respect to their construction. In Rome the population was peculiarly situated with respect to water supply. At first they had recourse to the Tiber, and to the springs and wells we have mentioned; but these soon proved unsuitable and insufficient. In order, then, to bring pure water from the hills which surround the Campagna, recourse was had to the construction of aqueducts; and these splendid erections were gradually increased until they at last amounted to fourteen in number, and became the admiration and delight of the citizens. The aqueducts, we need scarcely explain, were structures precisely similar to the viaducts of some of our larger canals, with the addition of a covering, and were carried at one uniform level over valleys and through mountains. It has been argued that from this method of conveying water, the Romans were ignorant of the fundamental law of hydrostatics, that water will find its level, or they would have made use of pipes. But it requires no great dialectical skill to prove that this argument is simply preposterous. The Romans had fountains before they had aqueducts, and had pumps employed in their fountains; and, in fact, as we have elsewhere observed, they did employ pipes even in their aqueducts, when sweeping round the base of a hill. In truth, it has been far too readily assumed that the aqueduct is an unscientific mode of supplying water. Granting that their splendour arose from ostentation, this is no objection to their utility. The railway bridges and stations of our day are far worse off on this point. Besides, London is supplied on such principles; for the New River is little better than an aqueduct without arches and a roof, and is, therefore, a very bad aqueduct. But the celebrated Croton aqueduct of New York, the most striking piece of hydraulic engineering which modern times has produced, is, in all essential particulars, an exact reproduction of the *Aqua Claudia*, or the *Anio novus*; and might, with great propriety, have found a place in the treatise "De Aquæductibus" of that most estimable writer, Sextus Julius Frontinus.*

With regard to the plumber's work in the fountains, much of it was exceedingly curious. In addition to the common practice of supplying them from an elevated cistern, Vitruvius tells us—and but for that circumstance we should have remained ignorant of an important branch in ancient hydraulics—that the forcing-pump was sometimes used to supply them. They had lead pipes attached to them, and earthenware pipes, and even leather pipes, where flexible tubes were necessary to pass the intricate grooves and channels which their devices occasioned. Ornamental wheels and artificial cascades were very common; and the practice of supporting a ball or other spherical figure at an elevation by means of a column of water, was likewise in use. In some of the private fountains in Rome, and in the specimens dug up at Pompeii, the tubes were formed of elaborate workmanship in bronze, and sometimes in silver. The valves were constructed with great ingenuity, chiefly on the ancient and primitive plan still in use in wooden pumps. Their bronze cocks were peculiarly fine work, as regards their design and material. Every main pipe which was laid down in the streets had a large cock attached to it, by which the water was turned off or on, and which was furnished with square heads turned by iron keys. Perhaps the richest specimens of these instruments are to be found in the illustrations of Montfaucon's "Antiquities." An ancient stop-cock, discovered in the ruins of a temple at Capri, is still preserved in the Museum at Naples. It differs from the common stop-cock of our day, by having what is technically termed a "round water-way," or a water-way equal in area to the tube, which ordinary stop-cocks have not. With regard to the invention of soldering, it is exceedingly difficult to determine the exact position in which it is to be placed in ancient history. It is certain the Greeks and Romans used something answering the purpose of joining metals in this fashion; and Pliny speaks of a solder which he denominates *plumbum argentarium*, and which would seem to have something of the same composition as our common plumbers' solder. On the other hand, the method of fastening metals together by means of rivets was far more commonly in use; and indeed we are not sure whether it was not the only method known to the Greeks in their best days. We know for certain they were utterly unacquainted with the art of welding iron, and it seems highly probable they were also ignorant of the cognate art of soldering lead, which involves a much higher and more extended knowledge of metallurgy. We will give an illustration from the Roman plumber work of the aqueducts in proof of this. In rounding a hill or in crossing a valley they sometimes used lead pipes. In the latter case the horizontal pipe had, at its lowest points, openings for the escape of air. But it does not appear that the plumbers could make a curve or even construct an acute angle on their pipe. Where such bendings were necessary an elbow was bored in a solid piece of stone into which the ends of the two pieces of pipe were cemented after the same manner in which the joints were made in the pipes of earthenware. The water from the aqueducts was finally received into huge reservoirs, one for public use in supplying the fountains, and one for private use in supplying the dwellings. When a supply was granted to a private individual a branch pipe was inserted in the main: from this it was distributed to the leaden cisterns common to every house, and the supply was measured by a bronze tube termed *calix*, and which was stamped like an imperial measure: this calix was in the time of Agnetus constructed of lead; but the fashion was put a stop to when it was discovered that the water-officers used to cheat the inhabitants by compressing the pipe. We may add that the Romans, when they wished for perfectly pure water, employed two cisterns at different levels for the purpose of allowing the sediment to deposit in the one before it was drawn into the other.*

We have said all, or nearly all, we had to say respecting ancient plumber-work. We must now take a rapid glance at its early history in our own country, and particularly with respect to its application to the churches of the Middle Ages.

The churches and castles of Europe during the Middle Ages were almost uniformly covered with lead. The Saxons, in the earlier periods of their history, covered their buildings with slate, but their most magnificent structures were overlaid with lead. In the time of King Edgar the buildings added to the monastery of Croyland were, according to Ingulphus, strongly built of stone and roofed with lead; and in a statute passed in the fourth year of the reign of King Edward I. (A.D. 1276) to ascertain the value of real estates, commissioners were appointed to "visit castles and also other buildings compassed about, with ditches, to determine what the walls, buildings, timber, stone, with lead, and other manner of covering is worth." The lead in this case was what is commonly termed *cast lead*; the process of manufacturing which we shall afterwards have to describe. It was laid with all the skill and ingenuity which characterized the design and execution of the building of the period, and of the most approved methods known to the modern plumber. Thus the sheets were made narrow, and joined with the particular seams termed *roll joints*, which give to the mediæval plumber-work so much of its picturesque effect. Provision was made for the expansion of the metal; and neither solder nor nails were employed in the fastenings. But the department in which the plumbers of those days were particularly excellent was the ornaments of lead used in the exterior and interior decorations of the buildings. The beautiful trefoil and quatrefoil ornaments which were used to decorate the ridges, were always cast in lead; and we have a good example of such work on the roof of Exeter Cathedral. The little gilded stars planted on the ceilings over the altars were likewise cast of the same metal. Some remarkable specimens still exist in England of ornamental work in cast-lead. The leaden coffins which were dug from underneath the effigies of knights in the Temple Church are most curiously decorated with work of elaborate design. Some of the leaden fonts which are assigned to the tenth century are also distinguished by their ornaments of foliage and figures of animals. The water-cisterns were especially the object of profuse decoration. We have ourselves been familiar with some exquisite productions of this kind, but we regret to say that our impressions were most frequently obtained in the casting-shop of the plumbers before they were consigned to the melting-pot as old metal. We may mention here as a curious fact, that many old cisterns bearing dates from the twelfth to the fifteenth century have been discovered to contain a large alloy of antimony and tin. Now it is well known that though the Church of Rome enjoins her people to make all vessels in connection with the holy church of silver, many of these vessels, especially chalices and salvers, were, during the Middle Ages, made from pewter; and it is reasonable to suppose that the same method had found its way into the plumbers' shops and was applied to cisterns. We have also heard it suggested that in later times the enormous quantities of "tea-lead" imported from China, which is absolutely unfit for the common purposes of the plumber, were applied to the same use.

Another very remarkable point of the plumber's business during the middle ages was the construction of the organ-pipes in the churches. This scientific work was executed often by the same artists who covered the pointed roofs with sheets and cast the ornaments for the altar. The practice was common even down to the foundation of St. Paul's Cathedral, for the fire which occurred there during the progress of the works was attributed to the plumbers who were repairing the organ-pipes.

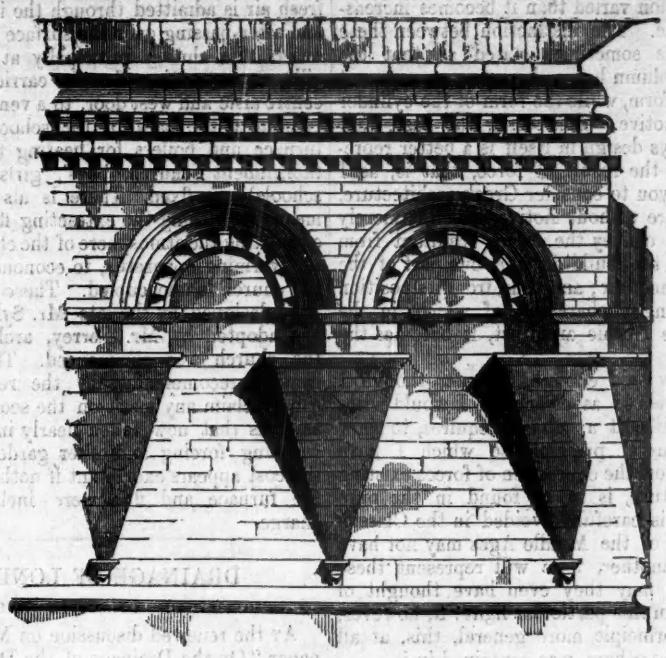
"Last scene of all which ends this strange eventful history" was the plumber's connection with the obsequies of the dead. We have mentioned the ornamented leaden coffins of the Knights Templars; and we have only to add that these were very common in England, particularly after the Crusades. Geoffrey Mandeville, who died during the reign of Henry I. under the curse of excommunication, could not be buried in consecrated earth. "Therefore," says Camden, "some of the Knights Templars enclosed him in a pipe of lead and hung him upon a tree in an orchard at the old temple!" Edward the Black Prince being dead, "his body," says Froissart, "was embalmed and put in a vessel of lead;" and the corpse of his successor, we are told by Harding, was "lapped in lede," and so from that time thenceforward were the mortal remains of the kings of England.

In our next article we shall speak of the causes which have led to the great change now to be found in the whole scope of the trade, a change among the most remarkable in the history of trades connected with building.

COMPETITION: NATIONAL SCHOOLS, BRIDGNORTH.—This competition has been decided in favour of Mr. Barry, of Liverpool, whose design is to be forthwith commenced.

* See for a compendious summary of the arguments, as well as a description of these structures, the art. "Aqueductus," in the "Dict. of Classical Antiquities."

* See the last three chapters of Vitruvius; Montfaucon's "Antiquities;" Sir W. Gell's "Pompeii."



BRICK CORNICE FROM SIENA.

BRICK CORNICE FROM SIENA.

We would add one example to the specimens of brick architecture from abroad recently given.

Nearly all the picturesque town-gates of Siena are studies both for the architect and painter. They were all probably once of a similar character,—a square tower, pierced with a gateway; but they have been terribly mutilated. The bold and elegant brick cornice now engraved is from one of these.

ON THE CONTRAST BETWEEN CLASSIC AND GOTHIC ARCHITECTURE AS EVIDENCED IN THE TREATMENT OF APPARENT WEIGHT.

Every material which is at the disposal of the architect has two sets of properties, those of inertia and the like, connected with the laws of motion, inherent in matter, and those which arise from the process of formation of the specific material. The former class of properties we admire in a building of antiquity. The weight and solidity of its masses, the perfect resistance of the several thrusts, all the forces caused by the arrangement of its parts, being perfectly balanced. The latter class, the internal qualities of the material, we should admire where it is employed mainly for its appearance, and whenever a form of construction is adopted which is not either simple superposition, or arching.

Connected with this broad distinction is another, peculiar to the designs of the architect, that, namely, between the modes of communicating his ideas;—the first, where this communication is effected notwithstanding the nature of the material; and the second, where the communication is effected by bringing more prominently into view some peculiar quality of the material. To illustrate this, I may suggest that all arches are instances of construction, notwithstanding some properties of the materials employed, their fragile character, and their weight; and that a span roof brings into notice the tenacity of the timber or iron.

I think we may assume that construction, when dependent on general qualities, leads to the grand; while that on the peculiar qualities of the material, nearly as surely to the merely useful. It has been told us frequently to study nature, to go to nature: we have a right to call the employment of the natural qualities of our materials, their peculiarities, going to nature. Wood, hemp, and iron are adapted by nature for tension, for they are tough, but a savage could know this, and yet remain a barbarian in art. An artist goes to nature to perceive those general laws which are to be found, spite of the natural peculiarities of the material. All this the great architects of any age must have felt intuitively, and they have adopted styles. They have found that the ideas which they had to convey were best transmitted as by their fathers, but they feared not to alter; for, knowing the ideas, they could recognise them in the expression, and could vary their details till that was produced. Hence their styles succeeded each other, and proceeded in the same direction. The improver of a style expressed in his work all that the previous work had expressed, and something more. Such progress cannot be accomplished but by the possession not only of the power of adapting details, but also of the key to their meaning. This power of adaptation I am sure we possess at the present time. Of a clue to the meaning of our art I see hardly any signs. As others have done, so have I, inquired of those most capable, as I supposed, to afford me information. Why do you adopt such and such forms of detail in connection with others of a general character? For instance, why with the echinus capital do you introduce triglyphs in the entablature? Why dentils only with an attic base? Why not have an entablature when you have clustered columns? Why do you so carefully vary the shape of the fillets in Gothic mouldings with the form of the arch and the arrangement of the traceries? These and many others might be instanced as requiring an answer more satisfactory to the inquiring student than reference to the works of Vitruvius, or Paley's "Mouldings;" to the authority of the Parthenon or of Canterbury Cathedral. The buildings are fine; but why, we all ask, are these peculiar and unnatural-looking arrangements chosen by the architects to convey their ideas of solemnity and grandeur?

On such a subject each of us must take up a position and have in mind a central thought, wherewith to unite all the information he may obtain, and to act as a landmark in all his studies. Before our art can assume its proper position it must have its scientific basis. We must have learned to reason out the arrangements of the old styles, or of one at least of them, before we know the position which we occupy. The closer we examine the styles with which we are acquainted, the more likely are we to arrive at their meaning; and for this reason I have chosen to direct your attention to a single phase of architectural character. It was the evident intention of classic, and specially of Greek architects, to convey an impression of the weight of their materials, and of the Gothic architects to overcome any such impression. In fact, while the details of Greek and also of Classic architecture are generally contrived to represent the result of forces overcome, or *rest*, the Gothic intention is to exhibit those forces in the most striking aspect. This consideration is mixed up with another (indeed the latter is but a consequence of the former), that while, in the temple, the actuating principle or motive is to produce horizontal lines, that is, pressure,—in the cathedral the motive is to produce vertical lines, that is, extension or growth: in fact, to use an analogy carried too far in both directions, the Greek would use the trees when cut down, the Gothic would show the growth and progress of the forest.

In the first place, let me notice this remarkable difference between a Greek and a Gothic building. The Greek tells its whole story of weight and resistance, whether you examine it without or within. The Gothic values not this immediate satisfaction to the eye, but within you see arches whose thrust is unresisted; without, you see buttresses whose balance is out of sight.

Again, in considering a Classic arch, we readily perceive, that had not the arch been executed, the wall would have occupied its place. The opening was wanted, and the arched form and construction were adopted to carry the superincumbent mass; whereas in pure Gothic architecture, the piers, responds, and arches, so completely occupy the space between other piers, used also for carrying arches, that it is evident the arch itself was the important part of the design. This is also to be seen in the section of the mouldings; for whereas, in the Roman, though the architrave is of similar section to the epistylium, the surface only is discernible, while both architrave and soffit may be highly ornamented, or even paneled. In the Gothic, the mouldings are so formed in the substance of the masonry, that the solidity and proper form into which the materials are wrought, are brought clearly into notice; in the one case the surface representing the weight, in the other, the direction representing the force, is made the more important. If we pursue this investigation into the vaults of these two manners, we shall perceive this same difference, for while the Classic vaults consist of a surface from which panels are sunk and ornamented, leaving the angles alone of the original surface,—in the Gothic the surface is not touched save by superficial decoration, the angles where the forces of the vault must be supposed centred, are strengthened, and made the prominent part of the design.

It is difficult to speak decidedly on the subject of external roofs, for the question of their appearance is commonly considered as entirely dependent on the purpose of the covering consequent on the climate. No doubt the classic architects did not use steep roofs, because the rain would readily run off flat ones; but can we suppose that had the effect of a higher roof been compatible with, or advantageous to, their design, they would have had any scruple in using it? Neither can we doubt that the Gothic architects would have taken more pains to disguise their highly pitched gables, had there been anything discordant in their appearance with the rest of the composition. The striking contrast in the effect of roofs higher and lower respectively than 45 deg. is obvious. The low roof as clearly assists in giving pressure to the frieze, as the high roof assists in completing the general expression of those thrusts with which the Gothic structure seems to be kept in equilibrium.

The general system for giving importance to features in the Classic style is that of adding the mouldings to the surface of the wall, while generally that of the Gothic architects is cutting away till the lines are made more evident. The pursuance of this course on the part of the Classic architects shows that bringing the form more conspicuously into view (as appears to be the intention of Gothic mouldings) was not sufficient for their purpose, but that additional apparent substance must be given to the parts to enable them to fulfil their ostensible duties. This is another instance of the favour in which the inert qualities of their materials were held by the Classicists.

Another view which may be taken of this great difference between superficial and solid character in the moulding of an arch is, that the Classic intention is seen best by making prominent its depth, to convey the idea of its great

power of resistance to the superincumbent weight which they seemed to fear, and that the Gothic intention is to render more striking the force consequent on this weight by the multiplication of the representative lines. The Gothic arch strikes, as containing its power in the thickness of the wall, and more strikingly in its central portion,—power which is the effect of the weight in the act of its conveyance to the springing as the point of its support. In short, the striking characteristic of the Gothic arch is its thrust; and to express this, all its members combine; while the Classic arch strikes as containing its power in its depth, its representative lines being all situated on the surface,—power which is of resistance to the weight supposed to be entirely absorbed in the arch itself. Not that the Classic is deeper than the Gothic arch: I speak but of the relative apparent prominence of these qualities in them,—of depth and solidity, answering to bearing and thrust.

The use of a shaft in Classic architecture is for supporting a superincumbent weight, which must be laid on it without exercising any lateral pressure. Even admitting that it may be used to support arches alone, still their pressure must be counterbalanced by others equal and contrary, and the shaft is still the same, prepared for a dead weight only. But in refined Gothic this is not the case; for where several arches are supported on one shaft, each of them is represented in its section.

The square outline of the arch section, and the simplicity of the pier, may be traced from their origin, when both are rectangular, the pier being represented by the jamb or respond, in the Early Roman, till the square sectioned arch is found with the circular pier in the later Roman. This circular pier continues a connecting link to a late period: it is found in the French Flamboyant, but not in the English Perpendicular. But as the representation of forces became more valued, both pier and arch assumed first regular figures, as in the Early English, the pier composed of circles, the arch of rectangular suits; and then the architects giving themselves up more and more to the representation of force, all the varieties of sections, and what is as important, all the varieties of imposts, were designed to vary their expression, as we find them in the geometrical and Decorated styles of Northern Gothic.

I have now drawn your attention to the contrast exhibited in the representation of forces, overcome or active, as architects have treated them, in the arch and in vaults, in roofs, in the general modes of giving importance to the edges of openings, and in that most interesting of our studies, the relation between the arch and its pier. I would also say a few words on some other, perhaps more striking, contrasts—the form of the arch, that is to say, the omission by the Gothic architects of the horizontal portion of the semicircle in its conversion to the ogival form; also, the conversion of the leading lines of the building from horizontal to vertical. Both these alterations in the elements of composition, together with the absence in our own styles of diminishing columns, afford additional tests for us to discover the reasons for the operations of the Gothic architects, the key to their progress. The discovery of a single stone lying with its longest dimensions horizontal, is proof to us that the weight of the material has done its utmost, and hence the rest in which we find it; while the fact of a stone standing on its smaller base is a proof to us that a counter force has been used for the purpose of so placing it.

The horizontal lines of the Greek and Roman buildings recall the impression derived from the first of these positions: the vertical lines of the Gothic recall that of the second.

But it will be said that one of the most important features of classical architecture is the column: surely this is a stone set on end. There is, however, to be noticed this difference between the Classic and pure Gothic round column: the former is diminished, while the latter has universally its sides parallel. The diminution has this effect, that it gives the Greek column a firm seat, for it may be moved till one of its sides becomes perpendicular before any reduction in its stability is effected, before any portion of the mass overhangs the base, while the cylindrical pier has no sooner its vertical position varied than it becomes increasingly unstable. The distinction between these two forms is sometimes stated as that the diminished column has a character, an apparent object in its form, while the form of the cylinder is without motive. This being the case, that which displays design in itself is a better representative of the result of force, that is, as I would have you to consider Greek architecture, than the figure without motive, which is merely calculated to convey the forces resultant from the form of the building from one part of the structure to another; and thus, from its position alone, deriving a character, of which, in the hands of the Gothic architect, it becomes the exponent.

I have now said enough, I trust, though I have not done so as clearly as I would wish, and as so difficult a subject requires, to show that the general principle to which I have called attention, the expression of forces existing in the structure, is to be found in the pure Gothic, and is carefully avoided in the Classic. The masons of the Middle Ages may not have said one to another, "we will represent these forces," nor may they even have thought of their object in this particular light: if, however, they had a principle more general, this, at all events, among others, was contained in it.

THOMAS M. RICKMAN.*

WARMING CHURCHES.

I AM pleased to find that the subject of church warming is beginning to force itself on the notice of those most interested in the matter, viz. the clergy; for the large sums of money expended in attempts to warm churches, with the few instances where success has been attained, makes it really an important question. It is to be regretted that architects do not always provide in their plans for the introduction of some efficient mode of warming; it is often left until the first cold weather is felt, after the church is finished, when as a rule, the nearest ironmonger is called in to supply the omission, which he does by recommending any hot-air stove or stoves he may have in his stock, generally the latest novelty in name or form, and from the want of better information his recommendation is adopted; but when the stove is to be fixed it is found that no chimney has been provided, and the only alternative is to carry an iron pipe to the outside of the church in the readiest manner.

The rev. author of the paper on this subject in your last number but one, has, either from a misconception of, or defective information on the laws of heat, fallen into error; for instance, he says, "another objection to iron stoves is, that the heat, being transmitted through a metallic substance, which expands under the influence of fire, carries with it any impurities existing in the coal which are evolved in combustion; producing that stifling and oppressive sensation which every one must have experienced who has come within their reach." Now the effects here described arise, as is well known, from the over-heating of the stove, and the consequent decomposition of the air coming in contact with its surface, for the products of combustion can only escape when the stove is imperfect; again, in describing the mode of heating adopted at Rockingham and Weldon churches, he says, "the superiority of this plan of warming over that by means of iron stoves, consists in the purity of the heated air which ascends from the furnace, and being filtered, as it were, through the tiles, rises into the space above, purer than when contaminated by passing through any heated metallic substance." Here the case is exactly the reverse of that above—the materials forming the floor, and at the same time the cover to the flue, being imperfect conductors, do not become over-heated, and consequently the air in contact is not vitiated.

The rev. author's description of the arrangements for warming St. Stephen's, Westminster, is very vague, and as I happen to be acquainted with the system adopted there, I will supply his omissions. The church is warmed by hot-water pipes nearly in section of the form A, disposed in channels formed below the floor: fresh air is admitted through the internal walls, and after passing over the surface of the pipes, enters the church principally at the window cill: an extracting flue is carried under the centre aisle and west door, to a ventilating shaft erected at the back of the schools, where the furnace and boilers for heating the whole establishment (church, boys', girls', and infant schools) are fixed. There is also provided a means for closing the extracting flue, and then circulating the atmosphere of the church through the warming apparatus, to economize fuel when the church is unoccupied. These arrangements were designed by the late Mr. Sylvester, C. E., and adopted by Mr. Ferrey, architect, before the church was commenced. The system of heating recommended by the rev. gentleman cannot claim any merit on the score of novelty, as it is that now fallen nearly into disuse for warming forcing and other garden-houses, and the cost appears exorbitant if nothing more than the furnace and flue were included in the charge.

X. X.

* Read at a meeting of the Architectural Association on the 6th January. We must compliment the members of the Association on their activity and zeal.

DRAINAGE OF LONDON.

INSTITUTION OF CIVIL ENGINEERS.

AT the renewed discussion on Mr. Harrison's paper "On the Drainage of the District, South of the Thames," January 17th, it was argued as to the general question of the drainage of London, that with a good system of intercepting sewers, the gravitation plan could be adopted, for the upper districts, on both sides of the river; and on the north side, the whole sewage might be so disposed of; but on the south side, on account of the deficiency of fall, it would probably be necessary to resort to a system of pumping the low sewage, at some point, say at Deptford Creek, and there lifting it to such a height as to give the requisite fall from thence, by a sewer, into reservoirs, as proposed by Mr. Harrison, whence the matter should be delivered into the river, without any deodorizing, at a point low down, at the first turn of the tide from high water, so as to preclude the possibility of any pollution of the stream above the point of the admission of the sewage. It was contended, that the same skill by which steam power was enabled to be continuously used, for long sea voyages, could preclude any but very remote chance of casualty from a derangement of the pumping apparatus; and that in the cases of excessive rainfall, flooding might be prevented, by permitting the present outfalls into the river to be used.

As to the general question of deodorizing, it was argued, that like the employment of the diluted sewage for agricultural purposes, the schemes might be feasible for small towns, but that the immense quantity proceeding from such an area of houses as in London, appeared at present to preclude the general adoption of the system.

It was stated, that all the plans proposed, up to the present time, for the drainage of the southern district, were defective in providing capacity of main sewers, for conveying away the excessive rainfall.

It was shown that at present, when a heavy rainfall occurred simultaneously with a high tide, the districts by the York-road and along the river side down to Bermondsey and lower down, were flooded from the river, which flowed over the surface and down the gullies into the river, whence it flooded the houses. Therefore a greater pumping power would be required than had been mentioned, if the habitations were to be guaranteed from casualty, as they should be under a new and expensive system. It was contended that the outfall should be extended even below Greenwich, as any system of sewerage for the southern districts should be permanent, and allow for any amount of extension of buildings to the eastward.

It was hoped that the facts elicited by the discussion would be found serviceable in determining the ultimate system to be adopted, and that special care would be taken to avoid the "fallacies" which, it was contended, had been promulgated in some of the documents emanating "by authority" from the General Board of Health, particularly in the "minutes of information collected with reference to works for

the removal of soil-water, or drainage of dwelling-houses, public edifices, &c." (1852.) Asserted errors, both of theory and practice, contained in these documents, were pointed out, and it was contended that they set at nought all the received laws of hydraulics, the formulæ of De Buat and other experimenters of acknowledged scientific skill, and even the "Principia" of Newton, and only substituted fallacies for those rules which had hitherto formed the basis of the best practice. A promise was given that this should be proved at an early meeting of the institution.

DISCOVERIES IN THE APPIAN WAY.

SOME time ago we gave an account of the results of excavations in the Appian Way. We find the following more recent particulars in Förster's *Bau Zeitung*, under the head of "Italy:"—

A Roman journal contains a circumstantial account of the present state of the Appian Way, which has been excavated as far as the eleventh mile. Several popes attempted this gigantic undertaking, particularly Pius VI. who wished to lay open the whole road from Rome to Terracina, but was prevented from so doing. The reigning pontiff began the excavations in December, 1850, near the celebrated tomb of Cecilia Metella, some three and a half miles distant from the old Porta Capena, and extended them in the course of three years to the site of the ancient Bovilla, a length of eight Roman miles. The breadth of the excavation amounts to 100 palms, the middle depth one yard: the mass of earth thrown aside amounts to 277,532 yards. About twenty monuments were restored as nearly as possible to their original condition, and it is the intention to place all the most remarkable objects found during the excavations *in situ*.

Further researches are to be made sideways to about the depth of a yard, for it is to be noted that the now-opened Appian Way is not the old Roman road, but that which was formed over the first one in the Middle Ages. To raise the present one, all the remains of adjoining monuments were used, so that valuable historical inscriptions must lie buried under the modern level, as has often been shown whenever it was required to make excavations in the soil. Besides a number of valuable inscriptions, about twenty statues were found, all with the toga, among which antiquaries recognised those of Seneca and other great men. The operations are conducted by Canina, and cost 5,000 scudi yearly.

A NEW GERMAN PAPER-FACTORY.

AMONG the largest erections through German enterprise we may reckon that of the new paper-manufactory lately erected in Freiburg for Mr. Flinsch, of Frankfort-on-the-Maine. Hitherto, with but few exceptions, one has only seen such establishments there composed of detached buildings: here, on the contrary, everything is united in one vast fabric. The ground-floor of the west wing contains a store-room for unsorted rags, and holds 6,000 cwt. The roof is supported by three pillars. Parallel with this lies the sorting-room, where between forty and fifty persons are daily employed. After this come the washing and boiling rooms, the colouring-room, &c. On the upper story is the room for the sorted rags, consisting of three divisions, and, reaching to the roof, it extends over the whole wing, and holds 6,000 cwt. The centre building contains the machinery. In the two first stories are the cylindrical machine, the turbines, the half-manufactured material, the vats, the reservoir, &c. The room for the cylindrical machine is 42 feet wide, and reaches up to the third story. Sixteen cast-iron pillars support the eight machines which tear the rags. These pillars sustain all the motive powers of the machinery, and are made hollow, to let off the water used in the machine. At the foot of each pillar is a receptacle for anything which may have remained in the water. North of the machine-room is the glass enclosure for the turbines—a terrace-like erection of 42 feet in length and 15 feet in depth; the roof forming a gallery, from which is a fine prospect of the surrounding mountains. The three turbines (after Jonval's invention), of sixty-horse power, work the machine, pumps, &c. The room for the half-converted material runs parallel with, and is of the same size as, the machine-room. The material is kept below in firmly-pressed masses, each of which contains from 600 to 700 cubic feet, ready to be transported above, and from thence to the machine, which completes the process. It is raised by machinery on the west side of the room. The pump, reservoir, and other water-works are all on the third story, the centre of which is arranged as lodgings for married and single workmen, each consisting of a bed-room, kitchen, &c. East is the machine-room, which occupies more than half the wing. The machine itself is from the manufactory of Messrs. Wyss and Co. of Zurich. The improved smoothing or facing apparatus is constructed after the design of Mr. Flinsch, and is the largest in Germany. There is an hospital, too, for sick workmen, and the establishment is warmed by hot-water pipes. The design for the building, together with the machinery, was made by the firm of Mr. Schroeder, of Carlsruhe; and the execution is the work of Professor Schneider, of Freiburg.

THE WEAR OF IRON ROOFS.

OUR attention was directed a short time ago to an iron roof in the yard of a Bayswater omnibus proprietor, near Whitechapel, which had fallen after the late snowstorm. It was formed (between two low buildings) of corrugated iron, curved, standing on iron pillars, with a light tie-rod and king-bolt at intervals: it was about 30 feet in span, and 50 or 60 feet long, and was put up about a year ago as a shed for omnibuses. It cost 100*l*. With about 5 inches of snow upon it, as was stated, it came down; and when we saw it, it was closely embracing a heap of omnibuses below it. The iron both of the covering and the supports was rusted and broken in all directions. It had been painted over with gas-tar and resin. We mention the occurrence to show the necessity for care in the construction of such roofs, and for occasional examination and repair.

STATUES.

THE plaster model of Richard Cœur de Lion, by Marochetti, for the execution of which in bronze money has been raised by subscription, has been set up in Palace-yard, Westminster, immediately opposite the doorway of Westminster Hall, and in a line, the other way, with the gate into a court of the Houses of Parliament. The back of the statue is turned to the latter building, the face looking round towards Westminster Hall. The effect, in some points of view, is far from good, and yet we can scarcely point to a better site for it.

The statue of Sir Robert Peel, by the same sculptor, will probably be set up in the open space adjoining Gwydyr House, Whitehall, opposite the Treasury. The question of site has been the subject of long discussion.

A marble statue of Admiral Lord de Saumarez, by Mr. John Steell, of Edinburgh, has been erected in the hall of Greenwich Hospital, facing the statue of Lord Exmouth. It was commissioned so long ago as during Sir Robert Peel's government.

COMPETITION FOR THE NAPOLEON MUSEUM AT AMIENS.

THE Society of Antiquaries of Picardy have published the programme of a competition for the design of the *Musée Napoleon* at Amiens, for which structure the State has appropriated a site, and we are requested by the Commission to make their invitation known. The Museum is to consist of four principal divisions, appropriated to painting, sculpture, antiquities, and natural history, for which galleries and cabinets are needed. Amongst the other requirements are a grand staircase, a saloon properly decorated for the meetings of the society, a library for 10,000 volumes, and a hall for public meetings. The maximum cost, exclusive of heating and paving the approaches, is fixed at 18,000*l*. The designs must be sent in before the 16th of April, and will be publicly exhibited on the five following days. 120*l*. will be given to the author of the best design; 60*l*. to the author of the second; and 20*l*. to the author of the third. The programme has full particulars, and includes a schedule of prices, on which the estimate of each design is to be framed: it will be found at our publishing office, should any of our readers desire to measure swords with the French architects on their own soil.

NOTES AND INQUIRIES.

ARCHITECTURAL AND ARTISTICAL.

Roman Cement.—Much of the Roman cement which has been used to stucco houses within the last four years has a defect which perhaps the manufacturers can explain. After being painted—no matter how many coats or with what pigment—white lead or the oxide of zinc,—a black bloom comes through, sometimes within six weeks, and at others not for as many months. This must have been noticed by most of the users of this now invaluable stucco. I am just about to repaint two fronts, which have been done, one with zinc and the other with lead, within the last twelve months, and wish to learn if I may expect a recurrence of the evil. INQUIRER.

THE GREAT WESTERN STATION AT PADDINGTON.

THE new station for the Great Western Railway, at Paddington, covers a very large area, and presents a remarkable piece of construction in the iron roofs which cover the arrival and departure platform. There are three of these, side by side, with a centre transept, where four light iron pillars carry the diagonal ribs at the crossing in the centre. The ironwork displays a considerable amount of design, and the whole is very congruous. Colour is sparingly introduced,—red and grey. Each vault is covered at the sides, about half way up, with corrugated iron: the remainder is glazed.

The booking-office is very plain, but has a little colour effectively introduced in and round the skylight.

PROVINCIAL NEWS.

Yarmouth.—New barracks for the Norfolk militia are about to be erected in this town. They are to accommodate more than a thousand men, and will cost upwards of 10,000*l*.——A new wing is also about to be built to the town hospital, at the sole cost of a benevolent individual, who withholds his name.

Dunstable.—A new congregational chapel has been erected in this town, from drawings and under the superintendence of Mr. John Usher, of Bedford, architect. The building is Italian in style, 58 feet long, 41 feet 6 inches wide, and 26 feet high. It is constructed of grey bricks and Corsham stone dressings. The principal front is divided into three compartments, the two outer divisions projecting and forming staircase entrances to the gallery. The centre compartment, which is approached by a flight of stone steps, consists of three doorways with elliptical heads, above which is a window with nine lights. The stairs, turrets, and parapet are capped with stone on ornamental brackets and frieze. The interior of the building is fitted up with platform in lieu of pulpit, approached by two flights of stairs. From the platform, and leading to the first row of seats, is an acoustic apparatus. The seats are open, with solid chamfered and rounded ends. The roof consists of Memel timber framed into queen trusses, covered with diagonal boarding as high as the straining piece, the upper portion being ceiled horizontally and decorated with open iron-work in panels and flowers, to assist ventilation. The timbers of the roof are supported by story-posts standing on carved stone corbeilles descending the walls 6 feet. All the woodwork is stained and varnished. The interior is fitted up for gas. The cost of the whole was 1,400*l*. The building will accommodate 700 persons.

Littlehampton.—The contract for the extensive defensive works and barracks for Littlehampton-harbour, which has been taken by Messrs. Locke and Nesham, of London, will be executed under a low tender. The works will be on the west side of the harbour.

Evesham.—On re-opening Harrington Church, Evesham, Worcestershire, the other day, Mrs. Wyld, formerly a poor girl of the village, contributed 1,000*l.*

Carnarvon.—Considerable improvements are to be made in the county buildings here, which are to be rebuilt. The proposed new building will be in the Tuscan style, according to a plan proposed by Mr. Lloyd, architect and surveyor for the county. The principal fronts will be made of Mona marble worked up with a tool. The body of the court will be 52 feet by 42 feet. The building will be principally lighted by means of a plated glass dome. Apparatus will be fixed under the basement-floor to introduce a warm current of air, and to keep the court at an even temperature; and arrangements will also be made in the roof for ventilation.

Birkenhead.—An iron church is about to be erected here for seamen.

Birmingham.—The Bristol-road Wesleyan chapel, recently erected, was opened for public worship on Wednesday before last. The building has been erected by Mr. Thomas Upton, from designs by Messrs. Wilson and Fellows, of Bath. It is in the Perpendicular style, the front and southern side being constructed of Alvechurch stone, relieved by freestone dressings. The main feature of the front consists of two small towers, between which is the principal entrance-door, above this being a large window filled with tracery. Two doors (on either side of the towers) opening into a lobby, leading to the gallery, complete the front. The side walls are each pierced with five windows, with mullions, transoms, and tracery; and a pierced parapet runs along the top of the building. The pulpit and communion rails are made of polished oak. The roof is open, the rafters and tie-beams being stained of a dark colour. Accommodation is provided for about 850 persons, the whole of the side seats being free. In the rear of the building are class-rooms and vestries suitable to the Wesleyan economy; and also school-rooms. The cost of the whole of the erections has amounted to about 4,000*l.*

Huddersfield.—The Lion-arcade, which has been about two years in course of erection, was to be opened on Monday last. The whole of the shops and warerooms, with about two exceptions, are taken. The length of the building is 112 feet, and its width 43 feet. More than 6,000 feet of glass have been used in the roof, and 9,000 feet of plate glass in the shops and warehouses.

Sunderland.—Mr. Meik, the engineer to the River Commissioners, has published a statement of the cost of dredging in that harbour for the last twelve years. It appears that during that period the average cost has been 3½d. per ton, which includes every expense (except interest of capital) connected with the dredging-machines, and conveying the dredged material to deep water at sea in hopper barges. In 1853, the quantity raised was 276,800 tons, at a cost, for labour, of 2,464*l.* 11s. 6d.; materials for repairs, 1,297*l.* 17s. 2d.; total, 3,762*l.* 8s. 8d.; being at the rate of 3¼d. per ton. At the Tyne, where the dredged materials are employed to make land, instead of being taken to sea, dredging costs, it is said, three times as much as at Sunderland.

Newcastle.—A wet dock, 23 acres in extent, in connection with the various railways, having their termini in Newcastle, is proyosed for construction on the north bank of the Tyne, with a deep-water entrance of 23 feet.

Maryport.—A similar dock is also suggested for this place.

Dundee.—The Board of Ordnance have offered the Barrack-park to the town council as a place of recreation for the inhabitants on favorable terms.

Elgin.—The South Free Church, designed by Messrs. A. and W. Reid, architects, was opened on Sunday in week before last. It is in the Decorated Gothic style, with buttresses at each side, and a tower and spire at the north end (the latter not yet completed). The principal entrance is through the tower, the lower part of which forms the porch to the church. From the principal lobby a broad flight of steps at each side leads to the galleries. At the other end is the vestry. The exterior is of dressed stone from the Hospital quarry. The roof is somewhat open in the interior, and is painted in imitation oak, with gilt pendants. The windows are filled with obscured glass, with stained glass borders and rosettes. The south windows are of a more ornamental character—having the "burning bush" on the tracery, and borders of ornamental glass. The whole building is surrounded by an iron railing. The church is seated for 800. The various contractors were Messrs. John Lamb, mason; John M'Kenzie, house-carpenter; F. W. G. Urquhart, slater; John Gordon, plumber; Joseph Stewart, plasterer; John Kintrae, painter—all of Elgin; and Mr. Geo. Donald, of Aberdeen, glazier. The estimated cost is reckoned about 2,000*l.*; a debt of upwards of 600*l.* still remains on the building.

THE THREATENED CHURCHES IN LONDON.

In connection with our plea against the threatened wholesale destruction of churches in the City,—public buildings, the handwriting of a past generation, houses of memory,—we have thrown together, in one prospect, views of all those which have been pointed out for erasement.

No. 1 is St. Mary's-at-Hill, in Thames-street, of ancient foundation, as are all the others. It was injured, not destroyed, by the great fire of 1666, and was restored and partly rebuilt by Sir Christopher Wren, between 1672 and 1677.

No. 2. St. Martin's Outwich, in Bishopsgate-street, rebuilt in 1798 by the late Mr. S. P. Cockerell. It contains some interesting monumental remains, brought from the old church, and churchwardens' accounts from 1508 to 1545.

No. 3. Allhallows', Lombard-street, rebuilt in 1694, Wren being the architect. It has some very good carvings.

No. 4. Allhallows' Staining, where Princess (afterwards queen) Elizabeth stopped when she left the Tower. It escaped the Great Fire.

No. 5. St. Matthew's, Friday-street, rebuilt by Wren in 1685.

No. 6. St. Helen's, Bishopsgate-street, founded in honour of Helena, the mother of the Emperor Constantine, full of monuments and useful memories. The interior of the church is singularly picturesque and interesting.

No. 7. St. Swithin's, London-stone, in Cannon-street: was burnt, and was rebuilt by Wren in 1680. Within a modern case against the south end of the church, shown in our view, is all that remains of the famous "London stone."

No. 8. St. Michael's Bassishaw, in Basinghall-street, which being burnt, was rebuilt by Wren in 1679. It contains a tablet to Dr. Thos. Wharton, who distinguished himself by his exertions during the great plague of 1665.

No. 9. St. Michael's, Paternoster, Thames-street, originally rebuilt by Whittington, who was buried there. Those who erected his monument punned on his name, and inscribed it "*Richardus Albificans Villam.*" After the fire the present church was built by Wren in 1694; the spire was erected in 1713. There is an altar-piece by Hilton.

No. 10. St. Mary's Somerset, Thames-street, which serves also the parish of St. Mary Mounthaw,—formerly called St. Mary *de Monte alto*, or Monthaut. It was rebuilt by Wren in 1695.

No. 11. St. Margaret's, Pattens, Fenchurch-street, rebuilt (after the fire) in 1687, by Wren. It contains some good carving and a painting on the altar-piece.

No. 12. St. Catherine's Coleman, in Fenchurch-street, rebuilt 1734.

No. 13. St. Clement's, Eastcheap, rebuilt by Wren, 1686. According to the register books, the parishioners in 1685 gave the architect "one-third of a hogshead of wine."

No. 14. St. Mildred's, Bread-street, close to the new opening in St. Paul's-churchyard. It was rebuilt by Wren in 1683, and is remarkable for its interior.

No. 15. St. Anne and Agnes, in Aldersgate-street, formerly called St. Anne-in-the-Willows. The fire destroyed the old church, and Wren built the present structure in 1680.

No. 16. St. Edmund's, Lombard-street, destroyed by the fire and rebuilt by Wren in 1690. In the old church was buried John Shute, who published "The first and chiefe groundes of architecture" soon after 1550. The present building contains some stained glass and "Moses and Aaron," by Etty.

No. 17. St. Mildred's, Poultry, where originally a tablet said—

> "Here Thomas Tusser, clad in earth doth lie,
> That sometime made the 'Points of Husbandrie.'"

After the fire the present church was built by Wren, in 1676. There is a bust here by Nollekens.

No. 18. St. Michael's, Wood-street, the asserted burial-place of the head of James IV. of Scotland. The old church was burnt in '66, and the present erected by Wren in 1675.

No. 19. St. Mary's, Abchurch, completed by Wren in 1686. The interior is very peculiar, and has carvings by Grinling Gibbons of wonderful beauty.

No. 20. Allhallows, Bread-street, wherein Milton was christened. The present church was built by Wren in 1680.

No. 21. St. Peter's, Cornhill, traditionally called the first church founded in London. It was rebuilt by Wren after the fire, and has a carved oak chancel screen.

No. 22. St. George's, Botolph-lane, finished in 1674 by Wren, in lieu of the old structure, destroyed by the Fire. It contains a memorial of Lord-mayor Beckford.

No. 23. St. Benet's, Gracechurch-street, as completed by Wren in 1685.

No. 24. St. Olave's, Jewry, suggesting a long story of a mysterious people. It was rebuilt by Wren in 1676, and is the burial-place of Alderman Boydell.

No. 25. St. Michael's, Queenhithe, rebuilt by Wren in 1677. A doorway at the west end displays some carvings, probably by Gibbons.

No. 26. St. Nicholas' Cole Abbey, on Fish-street-hill: rebuilt by Wren (after the Fire) in 1677.

No. 27. St. Peter's Le Poor, Old Broad-street: rebuilt by Jesse Gibson in 1792.

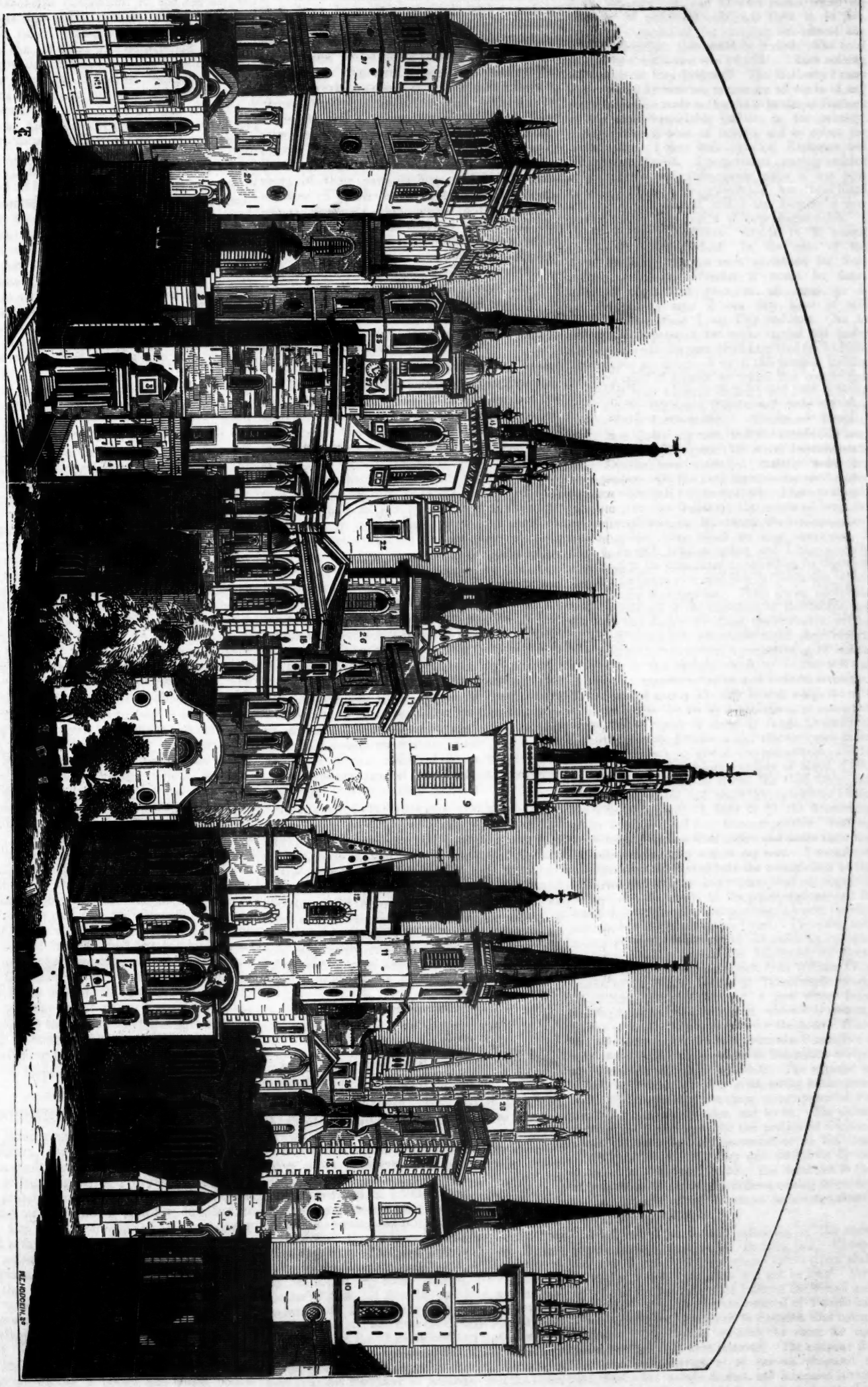
No. 28. St. Mary's Aldermary, in Bow-lane: built in 1510 by Sir Henry Keble, called

> "A famous worthy wight,
> Which did this Aldermary Church
> Erect and set upright."

The body of the church being destroyed in 1666, was rebuilt by Wren, and is a very curious specimen.

No. 29. St. Alban's, Wood-street, restored by Wren after the Fire, in the style of the old church. Inigo Jones had rebuilt the church a few years previously. Attached to the pulpit is an hour-glass, that the preacher when he "doth make a sermon, may know how the hour passeth away."

A glance at the spires and towers here brought together suffices to prove, amongst other things, the great fertility of design possessed by Wren,—and these are not the most important of his works. They all differ in a striking degree, and suffice to render the appearance of London when viewed from a distance different from that of any other in the world.



THE THREATENED CHURCHES IN THE CITY OF LONDON.

BRICKLAYERS' TASK-WORK.

Some two or three years ago I took advantage of the extensive circulation of the *Builder*, to lay before the public certain facts respecting what is called task-work or sub-letting, as regards the bricklaying department of the building trade, on which occasion I endeavoured to show them the mysteries connected therewith, and to give an *exposé* of the evils consequent upon the prevalence of that obnoxious system in the builder's trade. The result of these exposures, which you were kind enough to publish (although emanating from a humble operative), has, I flatter myself, been very beneficial to the trade in the metropolis; for I have observed with some satisfaction that since that time there has been a gradual diminution of task-work; and, with the exception of the houses that are carried up in the fields in the suburbs of London, which is vulgarly called by the bricklayers "field-ranging," the system might almost be considered abolished. Something of a revival has taken place at the new Cattle-market at Islington, but with what profit to the builder, or with what additional solidity to the work, it will be best to leave to the reader's conception.

A residence of a few weeks in Manchester has afforded me an opportunity to ascertain how work is carried on in that important town and in different parts of Lancashire; and the alarming extent to which sub-letting brickwork prevails, is a matter which ought to occupy the serious attention of persons engaged in the building trade residing in that part of England. It is a rare thing to see the brickwork of a building carried up by the original contractor: it is in nineteen cases out of twenty let to a bricklayer, who does the labour at a wonderfully low price—too low even to admit of an idea of good or solid work. Let your readers imagine common 9-inch walls, outside and inside labour, per yard average 7d. or about 25s. or 26s. per rod, and I think he will be able to judge what sort of work is done at Manchester; the consequence of which is that there is no time to perfect flues, or even to cut the bricks in the gatherings. The result is sure to be smoky chimneys, party-walls carried up by the run (and it is a wonder they don't come down in a similar manner), and in such a condition that not unfrequently a person engaged in conversation in one house has been known to suffer the serious inconvenience of being overheard by his next-door neighbour. I think, sir, something might be done to remedy this state of things in so large a town: it would be an improvement if there was a Buildings Act similar to London, as I was given to understand during my stay that there was nothing of the kind there: in fact, at the job where I worked there was no district surveyor, nor any one else to interfere, or to see that the work was properly done. Too much cannot be said in favour of the solid construction of buildings: language cannot be found too strong to condemn the pernicious system of piecework as regards brickwork: quality as well as quantity ought to be regarded, but the latter appears to be the ruling principle of those engaged in building pursuits at Manchester, at least according to the opinion of

A London Operative Bricklayer.

A SUGGESTION FOR A FREE LIBRARY.

The three requisites for starting a "Public free Library," are, as I would put it, a few books, a small room, and money enough to pay for the fittings, lights, and firing, for a person to be present during the time the library is open, and for the printing of a few circulars, to inform the neighbourhood of its existence. After it is fairly begun, these books may be lent out to subscribers of 3s. or 4s. a year. This subscription you expect will in some degree defray the expenses. As this is for a working base, you then apply to a more wealthy portion of the community to subscribe 10s. a year, with the privilege of choosing a book not exceeding 12s. 6d. in value, which will circulate among them; and also among subscribers of 6s. a year (who do not choose a book), and which books, after they have been sufficiently used, will be placed in the public free library. You now apply to the wealthy portion of the community to subscribe 20s. a year, with the right to order a book not exceeding 25s. in value, which, after they have been finished, and sent round to subscribers of the same amount, will then be placed in circulation among the 10s. and 6s. subscribers, to be eventually deposited in the free library. As soon as you have your system in good working order, get your subscribers to choose three among themselves, who will be willing to act as a committee to regulate the expenses, and sanction the purchase of works for the library. You will find that the value of the books chosen by subscribers will fall far short of their subscriptions. The 10s. subscribers (I speak from experience in this instance) generally order works of the value of 5s. or 8s. Some are content with what the others obtain, and neglect the privilege without reducing their subscription. Having now a considerable number of every class interested in the success of the institution, you are justified in expecting donations of books or money, which will enable you to increase your accommodation, and thus confer a greater benefit on the community.

Now this reads pleasantly enough on paper, but let us consider the motives and desires that will induce people to assist in carrying out the system. Every one will be benefited. You have united the whole community in a personal interest without mixing the classes, as the books at first only circulate among those who subscribe equally, and therefore the same care and cleanliness will be secured as in the country reading societies; and as few people have the time or inclination to read a book twice over in which they have not a personal interest, they can see it pass into the free library with the satisfaction of knowing that others are enjoying the same pleasure from which they have previously had ample gratification, and surely the charity that can confer a benefit on others without inconvenience to one's self must be pleasant, though it may not possess the material of self-denial to any considerable extent.

Then, as regards profit, each book will pay you interest on three classes of subscribers before it is fairly deposited in the free library—an advantage, if looked upon as of equal success with the common circulating library, of three to one,—a sufficient reason, I hope, to give you ample security against loss, and a justifiable confidence in eventual success.

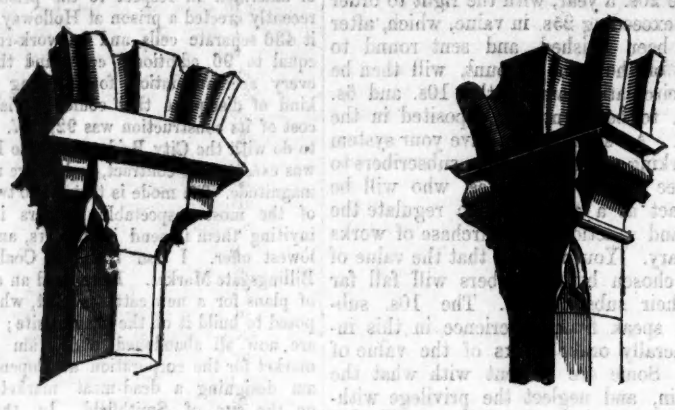
If you allow the previous arguments in its favour, you need not be afraid of any material falling off of subscribers: the appetite grows with what it feeds on, and its popularity will increase as the pleasure and instruction are appreciated. So, without saying anything about the social elevation and moral improvement which we trust will be duly developed, or of the spread of knowledge or marked intelligence of the masses, you may fairly consider your experiment will fully answer your expectations, and may therefore be pronounced a practical speculation.

W.

THE SALARY AND DUTIES OF THE CITY ARCHITECT.

At a recent meeting of the City Corporation Commission, Mr. Bunning being examined, said,—I am architect and surveyor to the corporation, and have been so since 1843. The appointment is with the Court of Common Council. I am solely employed by the City for all the operations which are carried on at their desire. When I was appointed, in 1843, the salary which I received was 1,600*l.* a-year, out of which I had to pay office expenses. In 1847 the salary was raised to 2,500*l.* a-year, out of which I had to pay office expenses, amounting, at that time, to 1,000*l.* a-year; but my present salary is 2,500*l.* a-year, with the addition of 1,000*l.* a-year for office expenses. The salary is made up in this wise:—1,300*l.* from the city's cash, 600*l.* for attending to the Bridge-house Estates, 500*l.* from the Finsbury Estate, 50*l.* from the coal fund, an estimated amount of 50*l.* for preparing plans of any property that may be leased, and 50*l.* from the Conduit Mead Estate. My income, on the whole, is less than that of my predecessor, and I am not permitted to engage in any private practice. My duties are very multifarious. I have to attend the Court of Aldermen and the Court of Common Council when required. For the former I have to watch all ruinous and dangerous buildings within the City. I have also to attend the committees of aldermen in respect to the prisons, and I have recently erected a prison at Holloway. There are in it 436 separate cells, and 14 work-rooms, which are equal to 96 additional cells; and there is, in fact, every accommodation for carrying out almost any kind of discipline that could be wished. The total cost of its construction was 92,655*l.* I have nothing to do with the City Bridewell. The Holloway Prison was executed by contract, and so are all works of any magnitude. The mode is to write to twelve or fourteen of the most respectable builders in the country, inviting them to send in tenders, and to select the lowest offer. I also built the Coal Exchange and Billingsgate Market. I prepared an amazing number of plans for a new cattle-market, when it was proposed to build it on the present site; but these plans are now all abandoned, and I am forming a new market for the corporation at Copenhagen-fields. I am designing a dead-meat market, to be placed on the site of Smithfield. In the case of the Royal Exchange, designs were advertised for from various architects. Whether it would be desirable to adopt that plan in all cases it is not for me to say: I can only hope it will never be done while I am City architect. As to the average expense of the works carried out under my control,—In the year 1852 I certified for 36,300*l.* To continue my duties—I am at this moment looking out for a plot of ground on which the corporation propose to erect a lunatic asylum; and I am in treaty for a site by the Seven Sisters-road, near the New Metropolitan Cattle-market. Emmanuel Hospital also comes under my care, and the almshouses connected with it. The great City street improvements have likewise been conducted entirely under my management. On the Lord Mayor's-day also I have to prepare the hall for the banquet. I have to attend, moreover, to the Guildhall, the courts of law, the officers' residences, the Monument, the Sessions-house, and the public stairs, which are very numerous. I have to do with London-bridge, and I have recently submitted to the committee a proposition for throwing hanging footpaths over each side of the bridge, which is now under consideration. There are no apprehensions entertained of the condition of the bridge, but Sir John Rennie and Mr. Page, the engineers, will be consulted before the committee make their report. My proposition will involve a projection of 12 feet on each side of the bridge, which, of course, will not improve its appearance as an architectural structure. I have also to survey the City Estate, which consists of 6,084 houses—to survey dilapidations, to assess the rents, and to report to the City Lands Committee. The Bridge-house Estates in like manner come under my care. I have to attend the committees, and to survey the property, which consists of about 6,000 houses. I have also to attend the Coal, Corn, and Finance Committee, and under that committee I built the Coal Exchange. I have to fix the boundaries under which the coal duty becomes payable. I attend the General Purposes Committee, and under them the Mansion-house comes within my care. I attend the Markets Committee, and have the management of the markets, and execute any repairs that are required. I have also to attend to the police-stations—six in number—and the chief commissioner's house, the city schools, and the Small Debts Court. There are, too, numerous works being carried out under my superintendence by direction of the Improvements Committee, including Cannon-street, from William IV.'s statue to St. Paul's; works in Threadneedle-street, Mark-lane, Dowgate-hill, and a new street from Farringdon-street to Clerkenwell, where it is contemplated to erect lodging-houses for the poor. There are also now before the Improvements Committee a new street from Cannon-street to Blackfriars-bridge, and the levelling of Holborn-hill. The expense of these improvements is very great, owing to the enormous sums required in the shape of compensation for goodwill, compulsory sales, and so on. The claims sent in, in this respect, for the portion of Cannon-street already completed amounted to no less than 1,177,153*l.* 2s. 4d. and they were settled for by the payment of 796,566*l.* 3s. 5d. The total loss to the City is about 200,000*l.* the difference being accounted for by the sale of the frontages in the new street, which are very valuable.

When asked as to the sufficiency of the main thoroughfares of the City, Mr. Bunning said,—Cheapside will be greatly relieved when Cannon-street shall be opened, which I anticipate will not be long. Frequent obstructions take place between the Strand and Cheapside. I think that the removal of Temple-bar would contribute very much to diminish that inconvenience. There would certainly be room for one more carriage if it were removed. The estimate for the new cattle-market as at present proposed is 300,000*l.*; but a hide-market and increased lairage are in contemplation, which would augment that estimate.



ARCHES AND CAPS IN WINDOWS.

A JUNCTION OF ARCHES AND CAPS IN WINDOWS.

Your recent illustrations of windows from Syracuse (Vol. II. page 767), show two ways of effecting this. In the accompanying sketches there is a somewhat similar arrangement, and I think the way in which the arch and jamb mouldings are brought down on to the plain chamferred mullion, so as to preserve the face of wall down on to the top of corbelling cap, is very ingenious, and does away with the awkward mitre, and overhanging effect of deeply-cut mouldings in such positions. The difficulty here encountered, appears to me greater than that shown in the illustrations I have referred to, where the arrangement is very straightforward.

The examples are from Sturry, near Canterbury. Couplets, trefoil headed in both instances, and each light is about 6 feet high by 1 ft. 6 in. wide. R. H. P.

PURIFICATION OF GAS.

As if to give force to our remarks lately on this subject, it has been simultaneously exciting no little interest in the City, and the *Times* has had a leading article on the matter. Dr. Letheby having sent a report to the City Sewers Commission as to the quality of the gas of the different City companies, in which he had given a favourable account of the Great Central Company's gas, was called on by the Court for some details, and appeared personally before the Commission, to whom, in reply to various incidental questions, he stated that in the course of his investigations during the last two years, he had found that some of the companies were supplying gas to this metropolis that, in the course of a few years, would tend to damage very much the atmosphere and the property in it, for it was so highly charged with noxious matter that he had obtained 21 *grains of oil of vitriol from* 100 *cubic feet of gas*, which was getting into the atmosphere. Then, again, there was a quantity of ammonia, which held in solution a large quantity of tar, and whenever there was a leakage in the streets it oozed out. During the last fifty years, when it had got into the public roads, it had rendered the soil near it so offensive that one could hardly move the pavement without doing a great deal of harm. What it may be in twenty years hence he could not say, but he thought it would be almost unsafe that the Sewers Commission should then disturb the pavement at all. The oil of vitriol which is in the gas had, he remarked, a decided tendency to injure furniture; and there was not a library in the metropolis the books on the upper shelves of which were not tumbling to pieces from this cause. There was *no controlling power over the different companies*, because the public were not aware of the presence of these impurities. They were burning this gas in shops where there was a large quantity of perishable fabrics. He thought nothing was more important than that the chemical qualities of the gas should from time to time be tested. Statements had been made in the public papers to the effect that invitations had been given to anybody to come to the works for the purpose of examining for themselves. This was all nonsense. The examination of gas at the gasworks went for nothing. It was the quality of the material as supplied to the public which must be tested. The combustion of gas so largely charged with sulphur, in combination with oxygen, was also very destructive to the windpipe and lungs, especially of persons in the daily habit of sitting for several hours in shut-up rooms where such gas was burnt. He had been examining the snow that had fallen lately round London, and had found it charged with sulphuric acid in combination with ammonia, and the same also with regard to the leaves of trees.* It proceeded sometimes in combination with ammonia, and sometimes in a free state; so that one could not get pure air within the bounds of the metropolis.

One fact we would wish to impress on all who feel an interest in this subject, namely, that defilement in the gas supplied to the metropolitan public is an old evil, which dates from the time when the companies had their own way entirely as to prices: so much so, that in frequently complaining of it in the *Builder*, before the movement in favour of "cheap and good gas" was begun, we used to remark that it would be bad enough to be obliged to pay even a low price for *bad* gas, but that it was doubly grievous and provoking to pay the high price then charged for so bad an article, and that the public might, at least, have their bad gas at a lower price. If compelled, therefore, at length, to provide a clean and inoffensive article, the companies have no more right to charge the public for making it clean and pure now than they had before they were compelled to reduce their prices, even were it the fact, which it is *not*, that the purification would cost them anything positively out of pocket; for the sulphuric acid, sulphuret of ammonia, &c. with which their gas is defiled are valuable, commercially speaking; and even although there should remain no positive balance of profit on the separation and retention of such products, the process of purification will, at least, very well pay its own cost, as smoke consumption does; and doubtless it is simply because it may not do more, if it be not from a still less excusable cause, connected with threats of adulteration for the purpose of raising prices, that so offensive and obnoxious an article is still sold, as of old, to the metropolitan public. Dr. Letheby, we may here observe, by the way, considers that however impure gas may be at the works, it becomes farther deteriorated on passing through miles of pipes; and this doubtless may be quite correct; but it seems to us that it only shows the greater necessity for original purification: and besides, according to Dr. Letheby's own report, the gas of one company is in reality found to be less impure after passing through the long line of pipes than that from other companies. Sulphur, comparatively innoxious, may readily be converted into the burning and virulent sulphuric acid or oil of vitriol, but this only shows that the sulphur or volatile sulphuret, whence it may be generated, ought, *ab initio*, to have been withdrawn.

Mr. Leslie, since the remarks by Dr. Letheby in explanation of his official report as examiner of the state of the City gas, has also been in communication with the City Sewers Commission, whom he reminded that six years since he pointed out the same fact which Dr. Letheby has brought under notice,—that the City gas, in passing through its long pipes, becomes deteriorated (*by previous deposits of a noxious description*), and urged that the gas ought to be purified on its exit from the mains of the companies. This, Mr. Leslie explained, was now done at the General Post-office, and at the *Times* office, by means of his "patents for the sanitary and economic combustion of gas for economy of fuel with ventilation;" and the consequence was, that while the weekly expenditure of gas at the Post-office, previous to the adoption of these improvements, was 245,000 cubic feet, it was now only 120,300; although, with the same number of burners, there is now more light than before. The success of the experiment at St. Martin's-le-Grand had induced the Government to send him to Liverpool, where the same improvements were carried out with the like success, as well as at Manchester. In these cases Cannel coal-gas had been used. In reply to a question put to Mr. Leslie, he stated that the cost of apparatus for each house was 5*l.* to 6*l.*; for large establishments, of course more. The Commission resolved unanimously to refer Mr. Leslie's important statements to the General Purposes Committee, to inquire and report.

So far as regards the companies, it is surprising they do not see the immense field of profit, in private dwellings, which strict attention to purification of their gas would assuredly open to them. For large establishments, or gentlemen's mansions, Mr. Leslie's patents are of great value, wherever gas is so impure in its manufacture as it is in London; but to admit, as a leading principle, that the gas supplied by companies ought to be purified by apparatus to be purchased by every tenant or landlord of a private dwelling, requires very serious consideration, since it would not only liberate the companies from all care or responsibility on their parts, as regards the purification of their gas, but must inevitably thereby lead to anything but sanitary improvement, inasmuch as every private dwelling assuredly never will have its gas so, separately, purified; and therefore, unless the companies are to be held responsible for the purity of their gas, matters are likely to fall from bad to worse, so far especially as regards private dwellings. As for the noxious matters alleged to be deposited in the pipes, from which the gas is supposed to absorb its impurities, whence can such noxious matter have been deposited, but from the gas itself; and if the gas deposit such impurities, how can these be consistently charged with the contamination of the gas? Originally, all such deposits, if really existent, must be attributable to a slovenly and filthy manufacture of the article; and the sooner the companies are compelled to "consume" their own gaseous impurities, the better for themselves no less than for the public at large; for no sooner will that be done, than an immense expansion of the manufacture will arise from the growing demand for gas in private dwellings.

* Will this explain the curious deposit which the late snow-storms left on the painted stucco fronts of many houses in London?—ED.

PORTUGAL-STREET GRAVEYARD.

As a law writer, my *habitat* has been for twenty years in Clare-market, and my walk to chambers Lincoln's-inn, daily, past the cemetery which, until last year, was open to view, and fenced in only by an iron railing. The place was certainly not attractive, being crowded with graves, and bristling with tombs of every shape; but lately a hoard shrouded it from the public gaze.

Last week, seeing the gate open, and some loaded carts inside, I ventured to enter, and to my surprise not a vestige was left of a tomb, of a mound, nor of the sedgy vesture with which it was erstwhile clothed. The whole glebe was upturned, and all the monuments, even that of Joe Miller, clean razed!

A fragment of stone, here and there, gave note that I stood on a place of sepulture: one had inscribed, "*Sacred to the memory of* ——," but the legend here broke off. Another, covered with the workman's *blouse*, revealed only the words "hic jacet," or hic Jacket.

It occurred to me, the sphere of *my* earthly migrations has been circumscribed to the distance of a gunshot from this centre, where ultimately my mortal remains might find repose; but what hope is there now of any biding depository even in death. "Sacred to the memory"—is that but a figure of speech, or of cold mockery in marble? What has become of the gravestones? what of the tombs? what of the bones? Or is the freehold in the church an estate for barter, to be secularized whenever a tempting ground-rent offers? If so, a handsome profit may be realized from the crushing-mills at Lambeth, and a still heavier fund from animal guano, the accumulation of 500 years.

Many of the churches are, it appears, doomed to destruction; and where there are no suitable congregations, possibly it may be right to secularize them, for it is written, "My house is the house of prayer;" but the churchyards were solemnly dedicated by our forefathers; and although cemeteries should be shut up for the public health and benefit, they at least ought to be guarded by the veneration of the existing race.

The suburban cemeteries are certainly an improvement in this respect, and connect a sentimental memorial with every native flower. No sentiment is fostered by the repulsive graveyard—but, oh, stir not a clod from the grave of our kindred dead.

NECRO SCRIBE.

On part of the graveyard an hospital is being erected—so far good; but what next?

Notices of Books.

Baths and Washhouses; the History of their rise and progress; with statistics, practical hints, and plans, &c. By GEORGE A. CAPE, Jun. Secretary to the Lambeth Baths and Washhouses Company. London: Simpkin, Marshall, and Co. 1854.

IT was well and truly said by Bishop Taylor that "there is a natural analogy between the ablution of the body and the purification of the soul." Baths and warehouses are, or rather would be, were they sufficiently numerous, most useful agents in promoting both the physical and the moral advancement of the people. There has been heretofore a want of collected information relative to all matters, whether statistical, financial, or otherwise, connected with them. The present little work aids in supplying this desideratum and gives historical details of the baths of the ancients, which will increase the interest of the subject to the general reader, and promote the end in view, which is the extension of such establishments, both in provincial towns and in the metropolis.

It is judiciously remarked by Mr. Cape, that it is important that all who would induce others to embark in a scheme of this nature should be in a position to show that baths and washhouses erected at a moderate outlay are not barely self-supporting, but that they yield an ample profit; and, arguing from the results attained at other establishments, that those proposed are likely to be satisfactory in their working. The metropolitan establishments already in use, he observes, would have been more remunerative than they have been, had the outlay on each (between 20,000*l.* and 30,000*l.*) been more moderate. A first-class metropolitan district establishment he finds could be erected at a cost of 14,000*l.* site inclusive, and probably yield a profit of 8½ per cent. on the capital expended. A second-sized establishment for a large provincial town he estimates at a cost of 5,600*l.* and to yield probably 7½ per cent. For smaller towns, such as Bilston, 2,200*l.* he considers ought to be sufficient, to yield a profit of 5 per cent. Plans for such establishments are suggested. The work also contains a plan of the Lambeth Baths and Washhouses, and a view of the swimming-bath at that establishment. Swimming-baths he properly regards as very important adjuncts. We may infer from this little book that Mr. Cape will prove a very useful secretary.

The Builders' Price-book for 1854. By W. and H. Laxton, Architects, and F. W. Laxton, of the Middle Temple. London: Weale, &c.

IN the new edition of this price-book many of the prices have been raised, in consequence of the increased price of materials, and in some cases of labour. The prime cost of Memel fir, for example, which was last year quoted at 3*l.* 15s. is this year called 4*l.* 15s. The book contains its usual amount of information.

Rudimentary Treatise on Cottage Building. By C. Bruce Allen. Second edition. London: Weale.

THE second edition of Mr. Allen's treatise, improved by omissions, has an appendix headed "Economy of Rural Dwellings, for tradesmen and persons of limited incomes," by Mr. Weale, which is addressed particularly "to persons resident in confined and ill-ventilated districts, consisting either of small tradesmen or of persons of small incomes, the latter of whom almost wholly from necessity live in lodgings." Plans and specification are given for a pair of cottages, costing for the double house 380*l.* It is to be regretted that the plans were not wedded to more tasteful elevations than those given.

THE EDINBURGH ARCHITECTURAL INSTITUTE.—An ordinary meeting of members was held on the 12th instant, in George Street Hall. After the transaction of some private business, a paper by Mr. A. Thomson, of Banchory, on the "Hills and Valleys, Walls and Gates of Rome," was read by the secretary. The contents of this communication were illustrated by maps and sketches of Rome. In the opinion of the writer of the paper, the populousness of ancient Rome had been much exaggerated.

Miscellanea.

SUNDERLAND BATHS AND WASHHOUSES.—The total number of bathers in the year ending the 31st of December last, was 14,170—washers, 15,319; the receipts from the former having been 179*l.* 18s., and from the latter 345*l.* 18s. 4½d.; in all, 525*l.* 11s. 4½d.

GUTTA PERCHA AND INDIA-RUBBER.—Peron, according to the *Compt. Rendus de l'Academie des Sciences*, has invented a kind of paper made from gutta percha, which is considered to be superior to all other kinds for lithographs and engravings. Might not a sort of artificial vellum or parchment be readily made of gutta percha for the use of lawyers? The surface would require to be roughened, and the thickness could be modified to any extent. Another use for this Protean substance has been suggested, namely, the formation of a matrix for deposit of stereotype plates by galvanic agency, the matrix being prepared by simply stamping a sheet of gutta percha with a heated form of types. In the Great Exhibition of 1851, we observed some decidedly good printing, said to have been taken from gutta-percha plates, themselves prepared at once from a matrix of its own. Gutta percha and india-rubber can readily be prepared, with sulphur, so as to be as hard as stone, and stereotype plates so made, we should think, might do as well as metal ones. Might not such compounds be made useful in connection with the etchings on soap lately spoken of?

ROAD FROM KENSINGTON TO BATTERSEA-BRIDGE.—Have the residents of Brompton and its vicinity, in their anxiety to get an opening through Brompton-square, entirely overlooked a plan which, to my mind, would greatly beautify, as well as be most convenient to, the whole neighbourhood,—I mean the continuation of the road about to be constructed by the Commissioners of the late Exhibition on their new estate; so that, instead of its stopping short at the Methwolds Almshouses, it went on a few hundred yards further south, so as to end by the side of the Swan Tavern, Old Brompton; thus ensuring an almost straight line of road from Kensington-gore down Swan-lane, and Church-street, Chelsea, to the Thames and Battersea-bridge, whence a railway is projected to the New Crystal Palace. The few intervening yards a year hence will probably be built upon, and a most convenient and beautiful road spoilt for want of forethought.—H. R.

VENTILATION OF GAS PRODUCTS.—Your remarks on this subject are, I think, very important, but will it not be difficult to unite elegance with utility in the improvement? As a modification applicable to desk or counter lights, I would propose a hollow standard containing the gas-pipe, and connected by pipes (tin would do) with the outer air, so as to supply the burners with the fresh air necessary for combustion; and in addition, a tube suspended from the ceiling, with a bell-mouth made of ground glass, to convey away the products of combustion. You would thus also prevent draughts, such as there are at present between the doors and windows and the lamps, while the air of the rooms remains pure for breathing. Touching gas-stoves, to which an Englishman has an objection because he likes to see an open fire,—could not the door of the stove be made of orange-coloured Bohemian glass with a coating of red glass, the latter being cut through to various depths, to have the effect of flames? Or the stoves themselves might be made of a framework of iron with panels of red glass cut to any pattern, which would have a more pleasant appearance, and smell sweeter than the black iron stoves used at present. These stoves should always be made on the ventilating principle of inlet and exit pipes.—G. H. L.

A CAUTION.—Allow me to warn persons taking houses without examination by a surveyor, by relating a providential escape of an intimate friend of mine now residing on Surbiton-Hill, Kingston, Surrey. A few weeks since, sitting in his dining-room with his wife, at ten o'clock at night, an unusual smell of fire was perceived, and on removing the carpet, hearth-rug, and a portion of the floor next to the hearth-stone, he found three joists in flames. These three joists entered the outer wall, and were simply covered with about an inch of mortar and blacked over, and the stove was set upon them without any trimmer, which is usual. After using many pails of water, the fire was extinguished. Had my friend and his family gone to bed without ascertaining the cause of the smell of fire, no doubt the house would have been burnt down; and being a detached building, no one could have escaped to tell the sad tale.—A. Z.

SMOKE PREVENTION.—An apparatus which can be fitted up behind an ordinary register-grate has been patented by Mr. M. M'Laren.——Mr. George Carter, of Lombard-street, has patented certain improvements applicable to furnaces for cylindrical boilers.——A patent for corrugated flues and other improvements adopted at the Haigh Foundry, Wigan, has also been taken out.

"TEN PER CENT. TO SURVEYORS."—I enclose a card from a decorator, soliciting my patronage, and proposing to allow me 10 per cent. on the amount of any work I may give him. The proposition is so offensive, and the practice so degrading, that a few timely lines of animadversion in your journal might arrest the growth of such an evil, and induce my correspondent and others of his class, if they will do dirty work, to do it as much as possible in the dark, and as if they were ashamed. But I wish they would rigidly abstain altogether from bribe-giving, which is doubly cursed,—it curseth "him who gives and him who takes," and the unlucky employer is cursed too when he gets into such hands, by having his work badly done, and at 10 per cent. or probably more above the fair price. Look at some of our wealthiest builders, of whom we may well be proud,—do they ever hint at such a thing as commission to the architect? No,—their honesty, which in this as in other cases is "the best policy," precludes the idea, and they thrive. How often, on the contrary, does the cheat, if a trader, end in the gazette,—and if, alas! an architect, finish his days a humble suppliant to our benevolent fund.—H. B.

LIVERPOOL ARCHITECTURAL SOCIETY.—At a meeting on the 11th, after a variety of matters had been disposed of, some designs of coloured ceilings, executed by two German artists, for Lords Harrington and Salisbury, were exhibited. Mr. Horner noticed in them a mixture of Gothic and Classic forms which they would not find in the works of English artists. The Chairman observed that it was always so in the works of foreign architects. Mr. Picton said it was a question for discussion, both whether they were right in the matter, and in what the incongruity or inconsistency in the blending of the two styles consisted? Mr. Howard thought it possible that there might be a reconciliation of the two forms, under certain conditions.—Mr. Horner: By taking away the distinctive characteristics of each. Mr. Howard, in reply, referred to the epigram which represented Nature as combining Homer and Virgil to form Milton. After a few remarks from Mr. Picton, the subject was adjourned till next meeting. Mr. Duncan, the engineer to the corporation, exhibited his plans for the new water-works at Kensington, Everton, &c., illustrating his descriptions by frequent reference to some account of the works now being executed for the public by the water committee. The old reservoir at Kensington was constructed under the orders of the highway board, and occupied two acres. When the waterworks came under the management of the corporation, three acres of land were also handed over to them by the old board, where the new reservoir, which might now be considered as completed, had been formed, and between them they would contain about 18,000,000 gallons of water. The roof would be constructed with iron girders supported on pillars of the same material, and covered over with earth on the top, so that about five acres would thus be made available for pleasure-grounds or any other purposes, for the ornament of the town or recreation of the inhabitants. The average depth of the water would be 15 feet. Having stated it would be necessary, on account of the difference in the levels, to make two separate and distinct water-works, but capable of being connected if required, which had been done by carrying two pipes from this reservoir, and showed the boundary of the levels, the upper one of which the Kensington reservoir was intended to supply, he passed on to the one at Everton. This he stated was intended to supply the crest of the hill, which could not be reached by the other. It was found necessary, in the case of the Everton works, to raise water by artificial means, for which purpose a tower had been projected, upon the top of which would be a tank ten feet deep, and 75 feet in diameter. There would be another reservoir underneath, to be ready for a future time, if necessary.

TELEGRAPHIC.—The Hamilton and Buffalo division of the Grand Trunk Telegraph Line, according to the *Hamilton Spectator*, is now in successful operation. "At the office of the company may be seen by the curious, that novelty, in Canadian telegraphing at least, House's Lightning Printing Press. This section of the line will be worked throughout with the printing instrument." The completion of this section gives a total distance now working to the Grand Trunk Company of 880 miles, while the completion of the Montreal and Quebec section, by the same contractors, on the 1st proximo, will make an aggregate of 1,080 miles, or the longest line, under one company, in America.

SOMERSET ARCHÆOLOGICAL SOCIETY.—The third conversazione of this society was held at the Museum, Taunton, according to the local *Courier*, when Mr. Cave, of Norton Manor, read a paper on leases at Poundisford, to be followed by one on its architecture, &c. The Rev. A. W. Jones read a paper on "Pentacrinities," illustrated by ink drawings. Several objects of interest were exhibited to the meeting.

SOUTHWARK-BRIDGE.—The Bridge House Estates Committee, to whom the negotiation for the purchase of this bridge was referred, and who had before reported that the bridge directors had named 300,000*l.* as the price, now again report to the Common Council that no reduction will be agreed to, and that the directors will not bind the proprietors to the sum named. The committee also report that within the last six weeks, Mr. George Rennie, C.E. had examined the bridge for the directors of the bridge company, and was said to have found it in a sound condition. The committee had therefore again reported without employing any professional authority on their part to examine it. After some discussion, in which very different opinions were expressed as to the sufficiency of the bridge, even though sound, for the traffic anticipated in opening it to the public, the report, by a majority of 30 to 26, was referred back to the committee, to ascertain by professional inquiry the state of the bridge with reference to its strength and durability.

RAILWAY MATTERS.—An experiment for the purpose of testing the efficiency of a self-acting break, invented by Major Robins, took place lately on the South-Western and Windsor line. The invention, it is reported, effects a stoppage of the train without manual labour, within fifteen to twenty yards, the break being self-acting and worked entirely by the engine-driver. His Royal Highness Prince Albert came from Windsor Castle on purpose to see the result of the experiment.——Some years since we proposed as a problem for solution by inventive minds, the realization of a system of self-acting signals, whereby trains could of themselves announce their whereabouts at various points during transit, and other useful purposes be served, such as signalling to drivers from the line, by mechanical appliance to the steam whistle or otherwise, the occurrence of accidents, or obstructions ahead of them. We were gratified to be able to state last week that the self-acting signal system was being adopted on French lines; and now we observe that more than one form of such signals have been patented in this country, and are being successfully tried. By an electro-magnetic invention recently patented by Mr. Tyers, as lately exhibited by models before the Lord Mayor of London and various other gentlemen, every train passing a station gives notice to the station last left that the line is clear; it at same instant transmits to the next station in advance a signal of its approach. Signals can also be transmitted from any intermediate point between stations to give alarm and obtain assistance; and any official at a station can communicate with the driver of a train at any distance as he is approaching—fog and auxiliary signals being superseded. This latter signal is made by the apparatus being caused to sound the steam-whistle; and at the stations are self-acting registers, keeping an exact account of every signal made. The apparatus has been, it is said, successfully tested on the South-Eastern and Croydon lines.

THE RESTORATION OF ST. MARY'S CHURCH, YOUGHALL.—Since we first mentioned the proposed restoration of this church and urged its necessity, the north transept has been completed at the cost of 58*l.* 16s. without sittings. But the restoration of the choir is by far the greater, more important, and desirable portion of the work undertaken, and will cost at least 400*l.*; and for this the rector, the Rev. P. W. Drew, is now appealing to the public, "alike to those who know the importance of church accommodation, especially where there are large numbers of the humble classes, and to those who would grieve to see a *magnificent ancient structure*, which can be rendered so serviceable for the worship and glory of God, and highest interests of man, *falling rapidly into irretrievable decay*." We mention his desire, in the hope that the appeal may thus reach the eyes of some willing to aid in a good work.

LEEDS MODEL LODGING-HOUSES.—Mr. W. B. Denison has issued a report of the result of his experiment at Leeds during the last year. During the first six months a lodging-house for women had been kept open but signally failed, and it was then converted into a mechanics' home for a better class of workmen at 4½d. a night instead of 3d. and has had fair success during the last six months. Notwithstanding the loss on the women's lodging-house, the profit on the whole experiment is estimated at nearly 5½ per cent. which is 1 per cent. less than last year. The total receipts for the year were 456*l.* odd; expenses, 221*l.* odd.

THE FILE TRADE.—A general meeting of the file trade was held at Sheffield, on Monday in last week, when the workmen of fifty-four houses were represented. It was resolved that the file trade agree to postpone the demand for a new statement to 3rd April.

COUNTRY BLACKSMITHS.—At Dunse, in Scotland, according to the *Kelso Chronicle*, the country blacksmiths are moving for an advance of prices on account of the rise in coals and iron.

THE ENGLISH GLASS TRADE.—Mr. Jas. Hartley, the glass manufacturer, in the course of a lecture at Sunderland at the beginning of the week, stated the following interesting facts in reference to this trade:—"Previous to the repeal of the glass duty in 1845, there were 14 companies engaged in the manufacture of crown and sheet glass: they were increased during 1846 and 1847 to 24, and now are reduced to 10. In 1844, the last year of the duty, there were made by the 14 companies 6,700 tons of crown and sheet glass, paying 500,000*l.* duty: there are now 10 companies working 40 furnaces, with 284 pots, making 35,500,000 feet annually, equal to 15,000 tons, value 225,000*l.* being an increase of considerably more than cent. per cent. and at a charge to the public of less than one-half of the former duty. In polished plate there are six companies, being the same as existed in 1837, and consequently their number has remained stationary since the repeal of the duty, but their production is estimated to have doubled. They now make 3,000,000 feet polished plate annually, equal to 5,500 tons, valued at 450,000*l.* Of Hartley's patent rough plate, which has only been fairly in the market about two years, the quantity now manufactured annually is 2,240,000 feet of 2 lb. to the foot, valued at 30,000*l.* The produce of the little kingdom of Belgium, the greatest glass-producing country in the world, is 50,000,000 feet of sheet glass annually, equal to 22,300 tons, or 25 per cent. more than is made in England of both crown and sheet glass. They export of this quantity 85 per cent., of which 6 per cent. comes to England, and they retain 15 per cent. for home consumption: England retains 85 per cent. of its produce for home consumption, and exports 15 per cent., being about double what she imports. In Hartley and Co.'s glass tariff there are 7,329 figures; also 17 descriptions of glass with 51 thicknesses.

THE GLASGOW ARCHITECTURAL ASSOCIATION.—The second annual meeting of this association was held on the evening of Monday the 16th instant, the president in the chair, when the secretary's report for the past session was read and adopted. Office-bearers for the present were elected; and addresses, bearing upon the profession and art generally, spoken by several of the members.

THE SPHYNX.—According to the newspapers, a Frenchman named Mariette has at last succeeded in discovering the long-sought-for entrance into the Sphynx. "The entrance leads into beautiful marble rooms, which are supposed to be connected, by subterranean passages, with similar chambers in the adjacent pyramid."

THE ROYAL CHAPEL AT BERLIN, under the western façade of the palace, was consecrated on the 18th inst. with great pomp. The *Times* says,—"To judge by the luxuriant—almost excessive—accumulation of works of art, of various styles and times, concentrated within an octagon space of 80 feet diameter, it would appear to have been his majesty's desire to lay all periods of Christian art under contribution for the decoration of this house of prayer. The chapel, which is 115 feet high, towers over the western wing of the palace, just over the Portal of Victory, the arch of which is of itself 62 feet high, so that the extremity of the cross above the cupola of the chapel rises to a height of 223 feet above the level of the roadway beneath. This excessive height of the building will probably be little felt as an inconvenience, since the royal apartments and state rooms all lie on the second and third floors of the palace. The noble staircase which leads from the Weisser Saal to the chapel, is entirely of marble, as are also the walls, plinth, and floor af the latter. The altar, which is situate in a commodious recess on the east side, consists of a slab of oriental alabaster, resting on six columns, and is surmounted by a ciborium, or vaulted canopy, supported on four columns, wrought out of the entire blocks which the king received as a present for this purpose from Abbas Pasha, viceroy of Egypt. All the artists, architects, and even the masons and other workmen engaged in the construction of the chapel, as well as their wives, were admitted to the ceremony, the first act of which consisted in laying the last stone in a cavity left under the altar for this purpose, in which were also placed a record of the event, a drawing of the building, &c. and *a list of all the artists and operatives engaged in the work*.

NEW HOUSES UNINHABITABLE.—In a case at the Birmingham County Court lately, in which rent was demanded from a tenant who had quitted a house because the windows were without fastenings, the doors unhung, nothing painted, and the well-water muddy, a verdict was given for defendant.

MODERN EPITAPH.—The following epitaph, which for blunt prosaicism and "unadorned eloquence," is perhaps unrivalled, is about to be placed on a grave in a Norwich churchyard:—

"Nineteen years I was a maid,
Seven years I was a wife;
Seventeen days I was a mother;
And then it pleased the Almighty
To call me from this world to another."

IMPROVED ARTIFICIAL STONE.—M. Juste Giret, of Paris, has patented a process which consists in first calcining any sort of sand, earth, stone, or metallic ore, and while at a red heat pounding them in iron or granite mortars to an impalpable powder. This substance is then mixed with flux, and placed in a melting-pot, whence the products are precipitated in cold water, and instantly acquire the form of sand of various tints. They are again triturated, inclosed in fire-clay moulds and put into a furnace, where they become solidified.

VENTILATION OF SEWERS AND MINES.—We have often urged the economical use of the heat generated by ovens in preparing coke, which is but too often wasted. One useful purpose, suggested by Mr. Abraham Rogers, of Field-house, near Bradford, who has registered a modification of the coke oven for the purpose of ventilation, is the ventilation of sewers by their means. The mode of construction adopted by Mr. Rogers is said to have been first of all successfully used by him from 1835 to 1844, in ventilating a colliery near Rochdale, till the mining works were abandoned, and which it effectually did, not only at no expense, but with a profit on the coke manufacture besides. The smoke from the coke ovens opens into an archway, communicating downwards and upwards with a shaft, through which it is intended that the noxious gases of the sewers or other subterraneous excavations shall be drawn upwards, and probably decomposed as well as dissipated, as they ascend through the upper shaft or chimney.

LONDON RAILWAYS.—A correspondent writes,—"Now that the convenient and easily approachable station of the Blackwall Railway is opened, or about to be, directly, for the Woolwich traffic, it would be an immense convenience to the inhabitants of, and visitors to, Greenwich, if a branch were made (there can be no doubt of paying), from that railway over the Isle of Dogs to the ferry there, opposite Greenwich; as by this means people would avoid the unpleasantness of the passage of London-bridge and the offensive fellmongers' yards, &c."

[ADVERTISEMENT.]

GREAT FIRE IN BREAD-STREET.

61, Friday-street, Jan. 6th, 1854.

GENTLEMEN,—We have great satisfaction in informing you that the wrought-iron door made by you, and which was placed in the opening made by us some years since through the party-wall which divided our warehouses in this street from that which, previously to the late conflagration, we occupied at the rear of Messrs. Townend's premises in Bread-street, most effectually resisted the large mass of fire to which it was exposed for many hours; and we may also state, that so soon as the metal became sufficiently cool, the lock yielded readily to its key, and (excepting discoloration) the door does not appear to be in the least injured, or out of position.

We are, Gentlemen,
Yours very respectfully,
Messrs. Chubb & Son, LIDDIARD & CO.
St. Paul's Churchyard.

TENDERS

For new buildings at Erdington, near Birmingham, to be called "Retreat for the Aged, and Orphans' Home," to be built by and at the sole cost of Josiah Mason, esq. Mr. Isaac Newey, of Birmingham, architect. Quantities supplied.

Barnsley, Birmingham	£5,750	0	0
Allen, ditto	5,550	0	0
Creswell, ditto	5,400	7	5
Mountford, ditto	5,237	4	7
Johns, Moseley	5,154	0	0
Webb and Son, Birmingham	5,150	0	0
Buckler, ditto	5,000	0	0
Wilson, Handsworth	5,000	0	0
Grove, Birmingham	4,990	0	0
Hill, Sutton Coldfield	4,823	0	0
Greensall, Erdington, accepted	4,736	0	0

For the Australasian Bank, corner of Threadneedle-street and Finch-lane. Mr. Philip Hardwick, R.A. architect.

William Cubitt and Co.	£9,985
Holland	9,899
Piper	9,764
Grimsdell	9,734
Ashby and Horner	9,686
Locke and Nesham	9,553
Kelk	9,470
Lucas	8,983

For House, Threadneedle-street, for Mr. John Bannister (adjoining Australasian Bank). Mr. Henry Currey, architect. Quantities supplied by Messrs. Norris and Roberts.

	Gross.	Deduction.	Nett.
Holland	£3,489	£175	£3,314
Cubitt	3,490	250	3,240
Grimsdell	3,467	304	3,163
Ashby and Horner	3,420	300	3,120
Kelk	3,300	250	3,050
Locke and Nesham	3,291	285	3,006
E. O. Symons	3,295	327	2,968
Lucas	3,020	220	2,800

The deduction was for the upper part of the front, if finished in Portland cement instead of Portland stone.